EFFECTS OF OFFICE DESIGN ON PERSONAL CONTROL AND ITS CORRELATES

BY

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EFFECTS OF OFFICE DESIGN ON PERSONAL CONTROL AND ITS CORRELATES

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This research explored the construct of personal control as it relates to the office-place. The effects of several types of office design (the conventional, the open with panels, and the open pool) on perceived control and on behaviors used to assert control were studied. It also explicated general office aspects which correlated with personal control, workspace satisfaction and job satisfaction.

Two different organizational settings were used, one of which was followed longitudinally through a change in office design. The construct of personal control was found to involve controlling interruptions, controlling coming into or passing through the space, controlling noise, and arranging or rearranging the space. Controlling interruptions was most highly correlated with the construct.

The type of office design significantly affected the perception of control: those in both types of open offices perceived less control than those in conventional ones. Office design also differentiated the kinds of behaviors employees used to assert control in their workspaces. In open office settings people used more social-interaction types of solutions, while in conventional offices they used social and environmental solutions almost equally.

Office design influence was mixed or mediated by other work aspects for workspace satisfaction, morale, status recognition and privacy. It showed no significant effect on satisfaction with socializing and job satisfaction. Influence of others on job performance was closely related to job classification (job tasks) and not to office design.

Workspace satisfaction and job satisfaction were used as criterion variables to determine which general office aspects related to them. Satisfaction with the workspace was found most related to level of perceived control, level of morale, and the feeling that the space is really yours.

Job satisfaction was significantly correlated with only one variable, morale. However, those who were highly satisfied attributed the cause of their satisfaction to themselves, while those who were dissatisfied attributed it to external causes.

Photographs of office personalizations were also analyzed and design implications were discussed.

CHAPTER I
INTRODUCTION

Most working people spend as much, if not more, waking time in their places of employment as they do in their homes. Yet as a source of information on man-environment interaction, the workplace has been relatively ignored compared with less common settings such as psychiatric wards. Proshansky and Kaminoff (1980) have pointed out that the subjective sense of self is defined and expressed by our relationships with the various physical environments of our day-to-day lives. As a primary physical setting for many people, the social psychological-environmental aspects of the work environment warrant exploration.

Of particular interest is the office setting. The office is rapidly becoming the most prominent work environment in the modern world. A relatively new area of interest is the interface between the design professions and behavioral science. The office seems a fruitful setting in which to collaborate.

Many design decisions are being made for offices based upon tentative or naive assumptions about their influences on workers' behavior. One such example is the open office or landscaped office trend. Predictions of the benefits of this office plan are not always borne out. Some enduring problems are of a social psychological nature, leading to the suspicion that major effects of office layout are in this domain. This study is an effort to investigate the social environmental interaction as it relates to office design.

Environmental psychology, as a relatively new discipline, has not yet evolved a theoretical or methodological paradigm from which to start our explorations of the workplace. Some of the more well-developed theoretical approaches in the area are social psychological in nature: privacy (Altman, 1975); Sundstrom, Burt, & Kamp, 1980), personal space (Hall, 1969; Sommer, 1969), crowding (Freedman, 1975; Stokols, 1972), territoriality (Altman, 1975), social and environmental roles (Canter, 1977), stress (Zimring, 1981), and place-identity (Proshansky & Kaminoff, 1980).

Recently one concept has been emerging which seems to underlie and interrelate the previous approaches: personal control. Zimring and Reizenstein (1980) believe it is becoming a guiding concept in the environmental field. Personal control has been defined as "the ability to establish correspondence between intent and the consequences of one's actions" (Baum & Valins, 1979, p. 138). It is related to the above environmental concepts in that some may be the mechanisms through which control is achieved (personal space, territoriality, roles), while others may be the consequences of achieving or not achieving control (privacy, crowding, stress, place-identity).

Personal control is also one of those rare concepts which can be used to bridge different levels of research, as well as different content areas. Baron and Rodin (1978) have proposed that control is a central mediating concept in all social experience. Within social learning theory this may be thought of as internal locus of control: "the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics" (Rotter, 1966, p. 1). In a cognitive vein, personal control may be thought of as the motivator in goal-seeking behavior or as the mean of achieving some other goal. At a more macrolevel, it is similar to the sociological and political concept of "power" (Rappaport, 1977).

Wineman (1982) recognized the importance of control over the environment in the office setting as a way of reducing the negative impacts of certain environmental factors. The role of actual and perceived control in reducing negative impacts is to influence satisfaction, she concludes.

Because of its potential importance in explaining a wide range of behaviors, personal control is the theoretical framework through which this research is approached. More specifically, how do people perceive personal control, in a social-environmental sense, in an office? Does this vary with the physical design? To what other job issues is it related? How does control evolve and change in a new setting?

Open Versus Conventional Offices

The earliest open offices were the medieval cathedrals where church business was conducted and local business dealings transacted. In modern times the archetypal open office is Frank Lloyd Wright's 1904 Larkin Building, with it uniform row upon row of desks.

It was not until the 1950's and 1960's that systematic statements of principles of open-planning were devised. Perhaps the most well articulated is that of the "Burolandschaft" or landscaped office which originated in Germany. This idea was developed by a management consulting firm, with arrangements placed according to patterns of communication and workflow. This also allows flexibility for changing the configuration to fit the changing needs of the organization. A second emphasis is on egalitarianism, since all levels of the organization are in the same open design.

Today the term "open office" and even "landscaped" office has lost some design specificity. The use of barriers, partitions and enclosures, and the preservation of "private offices" for the upper levels of the hierarchy are a few of the variations which can create very different physical and psychological environments in open offices. Probably the only common denominator of so-called open offices is the lack of stationary, floor-to-ceiling walls totally surrounding a workspace for some portion of the employees. Yet even this one change, the elimination of fixed walls, may be termed a revolution in office design and require a major adjustment on the parts of the affected employees. This is particularly true of offices in the United States, which are now rapidly adopting variations of the open office, usually for reasons articulated in the "landscaped" office theory.

Speculation by architects, employers, employees, and researchers about the form and ramifications of employees' adjustments to the new design have been numerous. Nemecek and Grandjean (1973) classified most advantages and disadvantages as organizational, spatial, psychosocial, and ergonomic factors. However, there have been only a few studies which do explore the design of offices and very few which have systematically addressed these differences in both open and conventional offices. The following studies have attempted to compare open with conventional office design, usually in the context of a move from one type to the other.

Comparison Studies

In one of the first studies of this type, Hundert and Greenfield (1969) compared moves of various offices to both landscaped and conventional designs. Workers rated comfort and attractiveness of environment, information flow, sense of job involvement, morale and relations, and awareness of organizational functioning. When the move was from a conventional design into a landscaped one, they found that privacy was lost, distraction and interruptions increased, control of space around work stations decreased. Only information flow was rated as improved.

Canter (1972) cited two unreferenced studies which also studied a move to both conventional and landscaped offices. The landscaped office move was rated more favorable on workflow, team spirit and team work, directing away unwanted traffic, general atmosphere, and producing feelings of good health and lack of fatigue. The second study showed the conventional office rated more highly on "function and economy" adjectives and "security" adjectives. The open office was rated higher on "sociability" and "aesthetics." There was no difference on "group cohesiveness" and "layout and organization" adjectives.

Brookes and Kaplan (1972) studied a major United States retail firm prior to and nine months after a move from a conventional to an open office plan. Their measures were semantic scales on productivity, group cohesion and interaction, aesthetic response, and environmental description. Instructions were to describe the existing workplace , and co-workers' ideal workplaces. In comparing the new with the old office, the new open one improved in sociability, aesthetics, and geometry, but not in noise and bustle, privacy, or function. The new landscaped office did not achieve many aspects of the ideal workplace. Overall, personal control of space, quiet, privacy, and efficiency were lost in the move to the new quarters.

Boyce (1974) reported on a move by the staff of the British Southwestern Electricity Board from a number of scattered and different buildings into a single landscaped office building. The study consisted of surveys prior to the move, at four months after the move, and again at one year after the move. Measures on certified and uncertified sick leave were also obtained as an indication of staff morale. Questions on thermal comfort and ventilation, lighting, color, brightness, and window size were asked. Of more interest to this study are the results on some of the other variables. Noise ratings differed significantly by age, sex, and occupation on survey two (at four months), but not on survey three (at one year). Sources of this disturbance were people talking and phones. The move to the new offices was judged not to have made the noise level worse. Communications between and within departments became better with the move. The overall satisfaction with the building as a place in which to work was rated highly for the new building. However, this differed significantly by occupation and suffered a slight drop over time. The sick leave data showed no change from three years before to two years after the move. This was interpreted as no effect on staff morale. One conclusion drawn was that different environmental and social conditions may be required by different groups within an office.

Significant differences between men and women, types of staff and work done, and ages of workers were also found in the responses in a study by Manning (1970).

Summary of Findings of Comparison Studies

The recurring differences of demographic-type variables may be related to the differences in the breakdown of people holding different jobs (i.e., younger women in clerical positions and older men in management). It may be that different jobs require, or at least lead to a preference for, one type of environment over another. Wineman (1980) suggested the open office may not be the solution for groups whose work involves a high level of concentration and numerous phone conversations. However, an investigation of this thinking and its correlate—that those doing routine work want accessibility to co-workers because of boredom and social facilitation factors—found that people in *all* types of jobs preferred privacy (Sundstrom, Burt, & Kamp, 1980). These findings were explained using personal control-based theories (overload and privacy) and the symbolic value of privacy: the status attached to more private areas may be an important factor in preferences.

One of the few clear conclusions to be drawn from these studies comparing office designs is that adaptation to and relations with the office environment are dynamic processes. Particularly when a change is involved making the physical environment more salient, measures should be taken over time to record the evolving nature of attitudes and behaviors.

The behavioral changes that must occur with environmental change have the potential for being disruptive to the group's functioning. Styles of interaction would be in flux at first but would need to rapidly become normative for the group to accomplish its work. In order to capture this aspect, behavior should probably be monitored more quickly than in most of these studies.

The following is a brief summary of the major findings in the spatial and psychosocial aspects of office design, since these are the most applicable to the parameters of this study:

The *spatial* aspects were mainly size and control of space, which were decreased in the open plans.

Psychosocial aspects included morale (not changed), team spirit or cohesiveness (improved), sociability (improved), and privacy (decreased) with moves to open offices.

Methodological Considerations in Comparison Studies

Studies comparing the two office designs are not without their methodological challenges as Parsons (1976), in his review of studies on business offices, has pointed out. He has suggested several problems occurring when behavioral analyses are undertaken on the change from a conventional to an open office plan. These are

1. Organizational and personnel changes which may be concurrent with the office change;
2. New furniture, changes in colors, new lighting, and carpeting introduced with the move;
3. The novelty of the changes and the move which may temporarily alter attitudes;
4. Brookes and Kaplan (1972) pointed out that management attitude and work procedures may also confound office design.

In light of these suggestions, the question would seem to be: Which issues are related primarily to the environmental change and would not be so heavily influenced by changes in organization, management, or work procedures?

From the perspective of this paper, the answer would be: the social and environmental issues related to control of space. Two aspects to be addressed are the factors in the office which influence the perception of control of space, and ways in which people assume of enhance control related to these factors.

Personal Control Variables

Perception of Personal Control

People's perceptions of their ability to control their spaces would necessarily differ given different environmental props and different configurations of their spaces. This perception would be important in employees' adjustment to a different office design. McCarrey, Peterson, Edwards, and Von Kulmiz (1974) found an underlying bi-polar second order component in landscaped office descriptions which they interpreted as "degree of perceived control over one's transactions with the environment."

A concept that involves control of space is that of territoriality. Davis and Altman (1976) addressed territories in the workplace in terms of privacy and control of boundaries. They stated, "People tend to use work-places more effectively and responsibly when actual control and responsibility for the work-environment match what people perceive, and what they expect" (p. 47). According to their schema, perceived territorial control would be highest for the primary work-place for one person and lower for group territories, the extent of it depending upon the size of the group.

Three aspects of office research which are closely interrelated are control, social interaction (a discussion of which follows in the next section), and privacy. Indeed privacy has been defined as involving the ability to control information, stimulation, and contact to and from others (Altman, 1975; Sundstrom et. al., 1982). When applied to office settings, privacy has generally been defined as the ability to control some aspect of social interaction.

Goodrich (1982) studied fourteen different companies with a variety of physical environments and delineated the types of variables which influenced perceived privacy. Since privacy is based on ability to control, these variables should also influence perceived control. They are

1. Norms

What behaviors are allowed or expected within the company or workgroup? For example, in some groups, closing the door, personalizing the space, rearranging furniture, and other such control behaviors are not allowed.

2. Social variables

Cohesiveness of the group, size of the workgroup, and others may influence ability to exercise control.

3. Task variables

Goodrich (1982), Hedge (1982), and Wineman (1980) conclude that people with more complex and creative job tasks need or at least wish for greater privacy and fewer distractions. Sundstrom et. al. (1982) purported to test the importance of privacy as related to complexity of job. They expected that for more complex jobs privacy would be more important for satisfaction with the workspace and the job. Instead, people with different job duties seemed to perceive privacy differently, in terms of both amount of privacy and the physical components of a private workspace.

4. Demographic variables

Age, sex, and non-smoking have been associated with preference for design. The status associated with more private offices may influence desired office design (Goodrich, 1982; Sundstrom et. al., 1980 and

Sundstrom et. al., 1982). Konar et. al. (1982) explored the environmental characteristics associated with status in the office. The characteristics which discriminated high from low-status job categories were the nature of the furnishings, amount of space, capacity for personalization, and ability to control access by others. Each of these was related to perceptions of appropriate status support (or recognition), which in turn predicted job and workspace satisfaction.

5. Design variables

Boundary definition (Goodrich, 1982) and visual barriers (Wineman, 1982) were found to be associated with increased privacy.

Personal Control Behaviors

As Goodrich (1982) pointed out "people do not passively suffer from the lack of privacy" or control (p. 366). In his studies he determined some behaviors used as signals: informal and nonverbal cues, postures, furniture arrangements, working late, and going somewhere else to work. Feelings of annoyance with the others, fears of alienating the others, and anxiety about being unable to complete the work resulted from either being unable to enforce desires through cues or from these cues not being properly perceived. Davis and Altman (1976) observed that control can be achieved through various cues and symbols ranging from body language to closed doors.

Thus it appears very important to learn what behaviors people use to exert control and which of these are successful in the workplace.

People can assume personal control in an environmental context in numerous ways. In an office setting the two most important methods probably are communication with others through social interaction and direct intervention with the environment itself.

Each person belongs to many social groups, quite a few of which function at the person-to-person or small group level. Through socialization one learns which norms of conduct to invoke, depending upon the setting. These norms include spatial components, as well. Hall (1966), for instance, has analyzed the norms of several cultures for interpersonal spacing in different types of social interaction. Within such norms there is wide latitude for individual differences and adaptations, depending upon the circumstances.

Parsons (1976) points out that social interaction is the stuff of which organizational functioning is made. Although much of the office interaction is normative and work oriented, some is more informal and discretionary. Because of the obvious nature of the last statement, Parsons feels that office interactions have been neglected by psychologists. He recommends studying how a particular physical environment affects social interaction.

Ittelson, Proshansky, Rivlin, and Winkel (1974) have defined social interaction as "the behaviors and responses that individuals induce in each other" (p. 127). However, in office settings, most investigators have operationalized this in very specific and limited terms. When called "communication," research in landscaped offices show it is more effective than in conventional offices (Boyce, 1974; McCarrey et. al., 1974; Nemecek & Grandjean, 1973); the same is true for "information flow" (Hundert & Greenfield, 1969). Brookes and Kaplan (1972) found the open office improved on the "sociability" rating over the conventional. Wells (1965) discussed informal contacts, finding that walls decreased possibilities for informal contacts. Nemecek and Grandjean were told that "personal contacts" was one advantage of open offices. Noise, particularly conversations, was found to be a complaint in open offices (Brookes and Kaplan, 1972; Nemecek and Grandjean, 1973). Goodrich (1982) identified social interaction with social relations and found office layout can affect group involvement and morale both positively and negatively.

Sundstrom et. al. (1980) asked workers to estimate the amount of time they spent visiting with co-workers as a social interaction measure. They found this was correlated with distance of adjacent co-worker for secretarial, clerical and mechanical occupation groups and to time spent with the supervisor for supervisory, administrative, and technical occupations. On the surface, it appears that "time spent visiting with co-workers" seems to be tapping different dimensions of office interaction for the two groups. One is friendly visiting and the other more work-related interaction.

As much a form of communication as words or actions is a person's use of space and other aspects of the environment. In a survey of several London organizations, Joiner (1971) found offices were generally arranged so that occupants sat facing their doors. However, the use of furniture to create private and public zones within the office differed by occupation type and status. Academics had more open, less defined zone-patterns than did government and commercial employees, and high status business and government groups set more formal and defined interaction zones. He concluded that rituals of social interaction are an important determinant of spatial layout in organizations. These offices were one-person, walled and doored, but Joiner suggested that in open offices, personalizing of space would be very important. An attempt to relate personality characteristics with office layout and specific features in the offices found about 15% of the variance in certain office features was accounted for by personality characteristics.

Personalization of space has long been recognized as a basic spatial behavior usually associated with territoriality. Several studies (Hansen and Altman, 1976; Vinsel, Brown, Altman, and Foos, 1980) have systematized this behavior for college dormitories. Hansen and Altman found that personalizing of space occurred rapidly but changed somewhat in content over time. Reference items (calendars, maps, etc.) were most prevalent, followed by abstract objects and personal interest items, both of which increased significantly over the quarter. Relating decorating behavior with eventual dropping out of college, the dropouts decorated less than those staying and decorated with significantly more personal relationship items as compared with those staying, who decorated with significantly more personal interest items. However, these findings failed to to be replicated by Vinsel et. al., with the exception of an emphasis on personal relationships by female dropouts.

Using a similar typology, another study found that faculty members decorated their offices primarily with reference material and abstract objects such as art reproductions and scenic posters (Campbell, 1980).

In corporate office settings, Goodrich (1982) observed that the amount of personalization differed by job type and sex. Financial personnel, administrators, and engineers personalized their space least, while geologists, secretaries, and marketing personnel personalized most. Women used plants, posters, and personal items; men used objects of personal achievements or family attachments. Managers and executives displayed personal items such as art, furniture, and photos, which the researcher felt enhanced their status.

In response to any particular environment, people have a choice of behaviors along a continuum from environmental actions to social actions.

Intervention may be taken directly upon the physical setting or upon the social situation accompanying it. If a person in a room is bothered by noise, environmental solutions might be to increase the sound absorption materials or to close the door. Social solutions may be to post a "Quiet" sign, ask people to be quiet, or make people leave. Ignoring the noise or using earplugs might fall in the middle range of the continuum.

The above behaviors might also be ordered on a continuum of active-passive. The choice of behaviors is determined by the situation (which actions will accomplish the goal) and the personalities of those involved. However, particular settings may foster particular patterns of behavior or "styles" of coping. When the environment changes, different coping styles may emerge also. Behaviors may have to become more social, or they may be able to become more passive (as would occur with better sound insulation).

Satisfaction Variables

Worker satisfaction with various aspects of the work situation is recognized as an important performance consideration. Wineman (1982), in her review of the literature, concluded that a causal link has not been demonstrated between worker satisfaction and job performance in office settings. What has been shown, she stated, is that, "office workers perceive that their personal satisfaction with their office surroundings impacts their job performance" (p. 272).

Marans and Spreckelmeyer (1982) have formulated a conceptual model for evaluating work environments (See Figure 1). They suggest three key outcomes of interest: overall environmental satisfaction, job satisfaction, and worker performance. Although the model indicates that

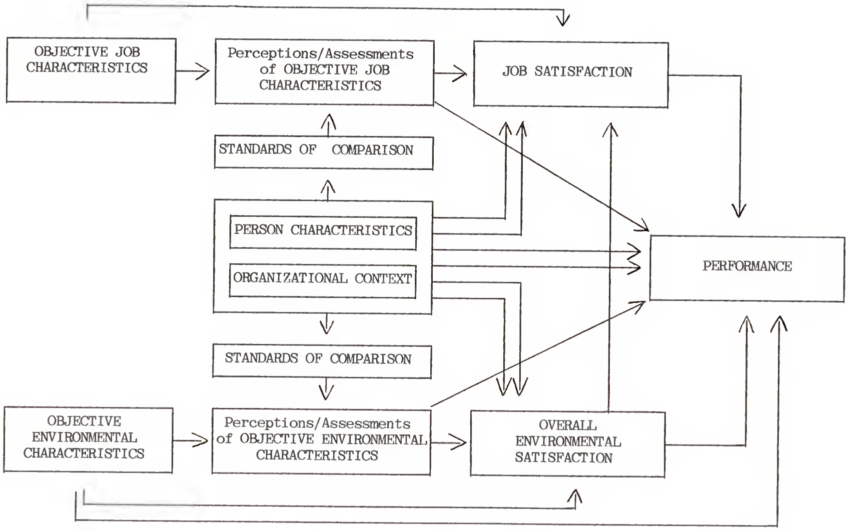
OBJECTIVE JOB CHARACTERISTICS
Perceptions/Assessments of OBJECTIVE JOB CHARACTERISTICS
JOB SATISFACTION
STANDARDS OF COMPARISON
PERSON CHARACTERISTICS
ORGANIZATIONAL CONTEXT
PERFORMANCE
STANDARDS OF COMPARISON
OBJECTIVE ENVIRONMENTAL CHARACTERISTICS
Perceptions/Assessments of OBJECTIVE ENVIRONMENTAL CHARACTERISTICS
OVERALL ENVIRONMENTAL SATISFACTION

Figure 1. Conceptual Model for Evaluating Environments (Marans and Spreckelmeyer, 1982).

overall environmental satisfaction is linked by a one-way arrow to job satisfaction and both are similarly linked to performance, empirical evidence for causal relationships is slim.

The Marans and Spreckelmeyer model suggests that overall environmental satisfaction arises from four sources: the characteristics of the employee, the organizational context, the individual's perceptions and assessments of several specific attributes, and objective attributes themselves. In a test of this model evaluating a federal office building, the authors found the most important predictors of work station satisfaction were the amount of workspace, the agency in which the worker was employed, and the work situation type. Generally, occupants of conventional, private office space expressed greater satisfaction with their workspaces than did those working in open or pool ("bullpen") arrangements.

Boyce (1974) measured overall satisfaction of the building as a place in which to work. When he compared the old conventional office with the new open office, satisfaction with the new office differed significantly by occupation and generally dropped slightly over time. Canter (1972) found that overall, people working in larger rooms were more satisfied than those in smaller ones. Yet this greater satisfaction involved a liking of the organization and the job itself and a dislike of the distractions.

The question has been raised whether or not research is discovering the workers' reactions to the office facility or to the job and the company, since people have trouble separating these (Pile, 1976). Sundstrom et. al. (1980) addressed this by getting ratings of satisfaction with both workspace and job. When the ratings were broken down by occupational groups, the supervisory, administrative, technical group rated their job satisfaction as significantly higher than the secretarial, clerical, mechanical group, but satisfaction with workspace was not statistically different for the two. Most highly correlated with workspace satisfaction for both groups was the rating on "pleasant place." Based on this study, it appears that, first, satisfaction with job and satisfaction with workspace are somewhat related but do form different patterns. Second, these patterns are different for the two occupational groups. Thus it seems imperative to measure job and workspace satisfaction as separate aspects.

In a similar study looking at privacy aspects, Sundstrom et. al. (1982) again assessed satisfaction with job and workspace by job classification. Secretaries, bookkeepers and accountants, and office managers and administrators were surveyed for physical and subjective correlates to privacy, satisfaction with workspace, and satisfaction with job.

With the job groups considered separately, only one physical feature correlated with privacy across groups—the number of enclosed sides. For satisfaction with workspace, those in non-private offices were most concerned with the distance to the nearest neighbor. Broken down by job groups, the most significant predictors of satisfaction with job and workspace were

	SECRETARIES	BOOKKEEPERS & ACCOUNTANTS	OFFICE MANAGERS & ADMINISTRATORS
WORKSPACE SATISFACTION	"PLEASANT PLACE" PRIVACY CROWDING	"PLEASANT PLACE" PRIVACY PROXIMITY	PROXIMITY VISIBLE TO SUPERVISOR JOB COMPLEXITY
JOB SATISFACTION	JOB COMPLEXITY	NOISE SATISFACTION WITH WORKSPACE	JOB COMPLEXITY VISIBLE TO SUPERVISOR

Konar et. al. (1982) investigated status support (the extent to which the workspace reflected the worker's status in the organization) as it related to both job and workspace satisfaction. A significant positive correlation was found between status support and workspace satisfaction and a weaker but still significant correlation between status support and job satisfaction. The relation between status support and workspace satisfaction was significantly higher for supervisors than non-supervisors. With job satisfaction the relationship was not significantly different between the job categories.

An interesting question when considering satisfaction is "to what do workers attribute their level of satisfaction?" One study using an attributional analysis found that inmates in a prison attributed more of their problems to the building (or the environment) prior to a move to a new facility (Smith & Swanson, 1979). One month after moving into the new prison building inmates attributed significantly more causality to themselves. Attributions went from negative to neutral toward the building and from positive to negative toward self. Six months after the move a new group of inmates attributed most causality to self and least to the building. Staff attributions showed a decrease in negative attributions toward the building and an increase toward other staff.

Another aspect of worker satisfaction is morale. Goodrich (1982) found that the type of office design could differentially affect morale. Boyce (1974) measured the amount of certified and uncertified sick leave taken by employees who had changed office type as an unobtrusive measure of morale. He found no change in the amount.

Coping With Change

Change may have both positive and negative results which may be either short-term or long-term. Altman (1975) emphasized a continuing (or at least longitudinal) evaluation of a new environment because reactions to a change in environment evolve over time. For example, people can adapt to noisy surroundings, but the long-term toll of stress may emerge later, possibly in the form of a psychosomatic illness. Or, the initial stress of changing environments, with learning new ways of doing things, may be resisted. These difficulties disappear in time with the advantages later becoming evident, such as a quarterly increase in productivity. Thus, initial negative reactions may mask more positive long-term gains and vice versa.

Sommer (1969) exemplified this when he rearranged a hospital ward, to the initial displeasure of both patients and employees. After a two-week period, interaction among patients had risen significantly as they learned to accept and actually make use of the changes. A similar type of change was analyzed by Holahan (1978) within a social systems model. Rather than viewing behavior change as a direct function of physical change, he attempted to account for the psychological, social, and administrative factors that mediated the behavior changes in the patients. Four temporal phases were posted as involving the environmental change process: petrification (view that established patterns are unalterable), unfreezing, resistance, and personalization (assuming personal control in producing changes). These seem to be subsets of Lewin's more general model of change: unfreezing, changing, state of mind and refreezing.

Underlying this change model is the idea that people are active in relation to their environment and that their response to environmental challenges is dynamic. In the unfreezing and changing phases of change, people may be using different styles of behavior to determine which ones will be most influential in the new environment. More fluctuations in behavior may occur then. During the refreezing stage, as new norms of social behavior are being accepted, coping styles would become permanent and interaction behaviors would become more routinized.

During the unfreezing and changing stages, personal control behaviors may be particularly evident as people go about reestablishing a "pecking order" in a new environment, determining new status symbols, and so forth. Once these are resolved, control may not need to be reasserted in the refreezing stage unless an occasional challenge arises.

Behaviors may be more active in the early phases and by refreezing become more passive in nature. Open offices allow more variations of behaviors to accomplish control, since walls, which are probably the greatest environmental prop for fostering control of space, are absent.

cf Peter Blake

To summarize, results of studies directly comparing reactions to office designs after a move from conventional to open offices are relevant in two dimensions, spatial and psychosocial. Spatial aspects of size and control of space consistently decreased in open plans. Psychosocial findings which occurred across studies were morale (not changed), team spirit or cohesiveness (improved), sociability (improved), and privacy (decreased) with moves to open offices.

Personal control has been approached primarily through control of territories and privacy issues. It was suggested that privacy (and probably control) is influenced by several types of variables: norms, social dimensions, task, demographics and design aspects.

In an effort to assert personal control, people seem to communicate with others through social interaction and also through direct intervention with the environment. Social interaction has been variously operationalized in different studies, with inconclusive results as to the effect of the office design. Aspects of environmental intervention that have been investigated were arrangement of furniture, which differed by occupation type and status, and personalization of space.

Satisfaction with the job and satisfaction with the workspace were found to differ by occupational group. Some aspects were closely related to office design, such as number of enclosed sides and distance to the nearest neighbor. Status support was found to be related to workspace satisfaction and slightly to job satisfaction.

Hypotheses

Open Versus Conventional Offices

This study is especially concerned with the influence of office design on the perception of ability to exert personal control over a workspace. Since different environmental configurations foster different behaviors, those in the separate designs may develop their own strategies for enhancing control.

Perceived personal control. Hypothesis 1. People in open offices will perceive themselves as less able to exert personal control than those in conventional offices. Hypothesis 2. Perceived personal control of those in open offices should increase over time.

Personal control behavior. Hypothesis 3. People in open offices will use more social than environmental types of control behaviors, while those in conventional offices will use more environmental type behaviors. Hypothesis 4. People in open offices will first use social type and active control behaviors, changing to a mixture of social and environmental and more passive methods of personal control than those in conventional offices.

Social facilitation theory states that the presence of others helps in the performance of routine and well-known tasks but hinders the performance of difficult or little-known tasks. This is compatible with the idea that certain types of jobs require more physical isolation because of the task. Hypothesis 5. Those in open office sections who perform complex tasks (professionals) will feel that the presence of others negatively affects their work performance, compared with professionals in the conventional offices.

Outside of task requirements, status is another aspect considered in evaluating workspace. A private office is generally recognized as a status symbol and different levels of privacy carry these subtle nuances of status.

Hypothesis 6. The professional group will feel that the open office space does not give them professional recognition compared with non-professionals while all levels in the conventional office section will feel that they do receive the recognition associated with their positions.

Non-work-related social interaction has been operationalized as "amount of socializing." This is often a complaint in open offices. Hypothesis 7. Those in the open office section will wish for less socializing at work than those in the conventional offices. Hypothesis 8. Those in open office sections will have a relatively lower morale than those in conventional offices and this will be attributed more to the building than to other sources. Morale should rise in open offices over time and be more similar across office types as refreezing of norms and behaviors occurs. The level will be attributed less to the building as the saliency of the environment lowers over time after the move.

Hypothesis 9. Workers in open offices will be more dissatisfied with their workspaces than those in conventional ones. Satisfaction in open offices should increase slightly by six months as the behaviors become normative and refrozen.

Satisfaction

Hypothesis 10. Satisfaction with the main workspaces will be highly correlated with peoples' perceptions of their abilities to exert personal control over their spaces.

Hypothesis 11. Satisfaction with the main workspaces will be highly correlated with the feeling the space is really theirs.

Hypothesis 12. Personalization of space will correlate highly with satisfaction with workspace and feeling that the space is theirs.

Hypothesis 13. Satisfaction with workspace and job will be moderately positively correlated.

Hypothesis 14. Those who are satisfied with their jobs will attribute the level to themselves; those who are dissatisfied will attribute it to other sources.

This research consists of two studies in separate settings. The first study was longitudinal in nature and consisted of efforts not only to investigate personal control and its correlates in different office layouts, but also to study the dynamics of change (in this case of office design) over time.

The second study concerned a still different office layout and investigate personal control and its correlates but with no longitudinal dimension. Therefore, the second study will not test the time factor in some of the preceding hypotheses.

The methodology and results of the two studies are reported separately. The discussion includes conclusions from both studies.

CHAPTER II
METHODOLOGY

Experiment One

Subjects

Subjects were the employees of a quasi-governmental organization, the St. John's River Water Management District which is located in rural northeast Florida. The function of the Water Management District is to oversee water-quantity related problems and manage water resources in the St. John's River Basin.

Setting

At Time 1 the employees were housed in several different locations. The main office site was a large warehouse-type building which had been divided into individual offices. This housed the administration and planning units. For the most part, people had their own cramped quarters. Also at this site were trailers, one each housing the real estate and graphics division, the division of permitting and the division of enforcement. These trailers were divided into separate rooms, usually with two people to a room.

The engineering division was located downtown, about five miles away, in three adjoining rooms of an office building. The supervisor had a separate room and the staff of six shared the other two rooms with no separations except the one wall between the two rooms.

At Times 2 and 3 employees had moved into a newly constructed building. The administrative section was primarily conventional office design, each person having a private office. Some of the secretaries had desks outside the administrators' offices and were surrounded by three walls.

The middle section of the building housed conference rooms, the library, bookkeeping and other support services.

The final third section of the building was primarily an open office section with private offices for the supervisors (department and division heads) along the window side. The three departments housed in this section were separated by walls, but within the departments, units arranged their desks as they wished. A representative floor of one of the departments in the open section is in Figure 2. Desks were surrounded by movable partitions six to seven feet high.

Procedure

Permission to conduct the study was obtained from the executive director of the St. John's River Water Management District, Mr. E.D. "Sonny" Vergara. At a staff meeting Mr. Vergara told the employees of the study and asked for their cooperation.

The timing of the study was planned around a move of the staff from their old office facilities into a new building. It was administered in three waves:

Time 1--conducted approximately two weeks prior to the move from the old office to the new;

Time 2--conducted one month after the move;

Time 3--conducted about six months after the move to the new office.

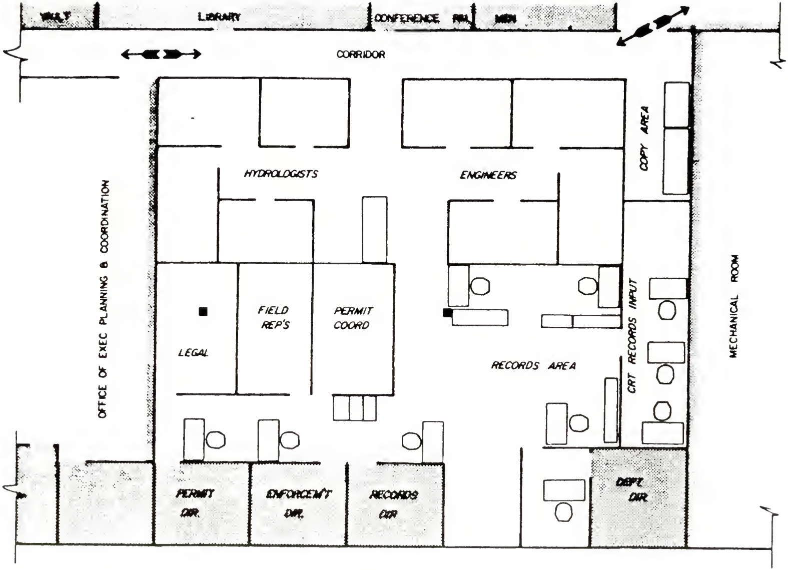

Figure 2. Floor Layout of St. John's Water Management District.

The questionnaire had been pre-tested and critiqued by a group of social psychology faculty and graduate students.

For the Time 1 wave, the questionnaire, along with a cover letter (Appendix A), was placed on each person's desk one evening. They were asked to mail in the completed form within a week. A predetermined study-number card was included with each form and people were asked to write their names on the card and also to put this number on their questionnaire. Thus the effort to insure anonymity by not having anyone's name on any completed form. A master list of respondents was made by matching study number on the form with the name and number cards.

The only group which did not participate in the Time 1 survey was the water resources division which had been housed at the local community college. This consisted of 15 or 20 people who had been moved into the new office in advance of the general move.

The response of the Time 1 survey was 38, or about 54%.

The survey at Time 2 (one month) was conducted by randomly choosing half the employees, with the plan that the other half would be sampled at Time 3. It was felt that asking people to complete a similar survey three times would lead to refusals and possibly non-thoughtful responses.

Study numbers from respondents of Time 1 were used and new numbers were assigned to the others. All questionnaires were pre-marked with a particular study number. The second survey and a cover letter (Appendix B) were placed on the selected employees' desks. They were given an envelope in which to place the form and were asked to deposit them in an envelope at the receptionist's desk within a week. Again, every effort was made to insure anonymity.

The breakdown of respondents from Time 2 was as follow:

Total—26; Number answering both 1 and 2--16.

Time 3 questionnaires were distributed at about six months after the move into the new office. Because of the low response at Time 2, the decision was made to ask everyone except those who had actually completed both 1 and 2 questionnaires to participate. Pre-numbered surveys were again distributed the same as previously. After several weeks two signs were posted by the entrances thanking those who had participated and asking those who had not to please do so. This resulted in one additional response.

The total response was

Time 1--38 (One additional questionnaire was received late, but it was not used because it pertained to the new office.)

Time 2--26 (One additional questionnaire was received, but it was not used since it referred to a field office.)

Time 3--36

Time 1 and 2--16

Time 1 and 3--15

Time 2 and 3--4

The response rates for questionnaires useable for the design comparisons were

	open	conventional
Time 2	25%	31%
Time 3	25%	42%

Personal Control Variables

What are the aspects over which one wants control and which would lead to the perception of having or not having control over one's workspace?

In the office setting, particularly the open design, the ability to control bothersome noise would seem helpful. Another might be controlling passage through by others, as well as preventing unwanted interruptions while working. Most people also like to stamp the area in some physical way, such as arranging the furniture and personalizing the area with pictures, plants, and so forth.

To ascertain the perceptions of the extent of control, questions on each of the above aspects, except personalization were asked on a four-point Likert-type scale.

Another way of asking the "control" question is to use attachment or ownership, such as the extent "you feel the workspace is yours."

Personalization Photographs

The purpose of this section was to study personalization of space. Photographs were taken of all desks and office areas in conjunction with Times 1 and 3 surveys (a few weeks prior to the move and about six months after the move). Pictures were taken with an Ashi Pentax 35mm camera using a wide angle lens. For time 1, black and white 3 x 5 prints were used. These were coded with the aid of a magnifying glass. For Time 3, color slides were obtained and viewed with a Kodak Carousel 600 slide projector. It was felt the slides might increase the clarity and ease the coding process.

Codes were developed with two purposes in mind: first, to include and account for all forms of personalization that occurred in the office setting; second, to provide some correspondence between personalization and categories used in other studies, particularly on college dormitory personalization. The code categories used were 1) Personal Relationships; 2) Values-Self-Expression; 3) Beautification-Decoration; 4) Humor; 5) Personal Use Products; 6) Messages to Others; and 7) Uncodable.

Personal Control Behaviors

Rather than impose operationalizations upon subjects and thereby restrict the range of responses, it was decided to determine specific social interaction problems and ask subjects what their behavioral responses were to them. Subjects were asked to list the ways they controlled whether or not people came into their spaces and ways they controlled whether or not they were interrupted. Responses from the first two surveys were listed on the third survey and subjects were asked which ones they had used and how well these behaviors had worked.

Satisfaction

Overall satisfaction with the workspace was assessed from the question: "In general how satisfied are you with your main work space?" The answer was a five-point Likert scale from satisfied to dissatisfied.

Satisfaction with the job was measured with a similar question. Employees were asked to attribute the cause of their level of satisfaction by the following question: "To what extent (percent) is this level because of each of the following:

YOURSELF ____________________; THE OTHER EMPLOYEES __________________;

THE ADMINISTRATION ________________; THIS BUILDING _________________."

A question on general level of morale for all employees was asked, with another attribution question similar to that above.

Experiment Two

Subjects

Subjects were the employees of Hewlett-Packard district sales office located in Orlando Florida. Staff consisted of sales and sales support (clerical) people, financial and credit specialists, and the service staff. Both the sales and service groups have scientific and technical backgrounds, with degrees mainly in computer sciences and engineering.

Setting

The main workspaces were located in one large room which housed all the employees. The floorplan is shown in Figure 3. This office was a standard Hewlett-Packard office, which are all designed alike. Desks were aligned in rows in the central part of the room as seen in Figure 4, in an open or "bullpen" arrangement. The only visual barriers were file cabinets of a height of 4 or 5 feet. These cabinets served more to separate one work-unit from another than to separate individual employees. In fact, individuals were not allowed to change the physical configuration of their workspaces. Figure 5 is a perspective drawing of this setting. Most of the perimeter of the room contained the offices of the managers and administrators. These offices were made of partitions of about 7 feet high which did not go to the ceiling. The lower half was solid while the upper half was glass. The offices had no doors. The only windows in the rectangular room were on one of the short sides in a three-foot high row across the side at ceiling height. At the other short end of the room were the snack bar and several closed conference rooms.

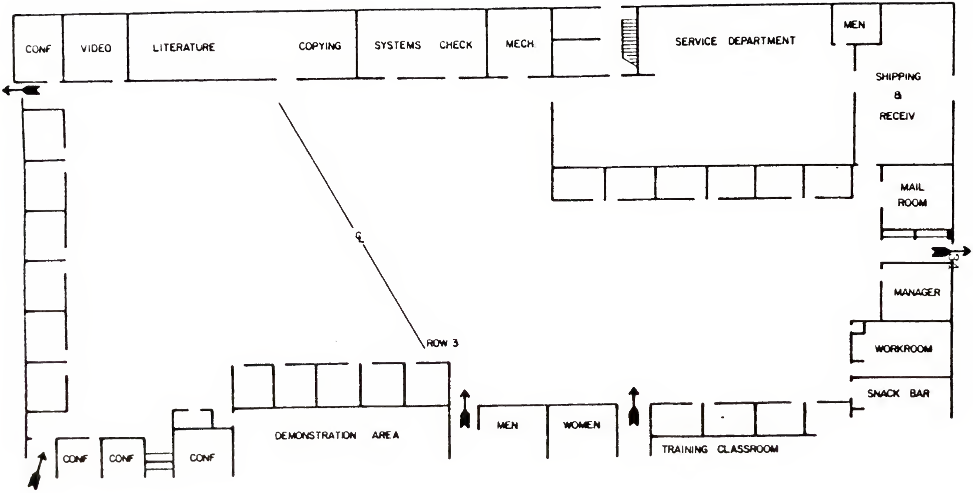

Figure 3. Floor Layout of Hewlett-Packard.

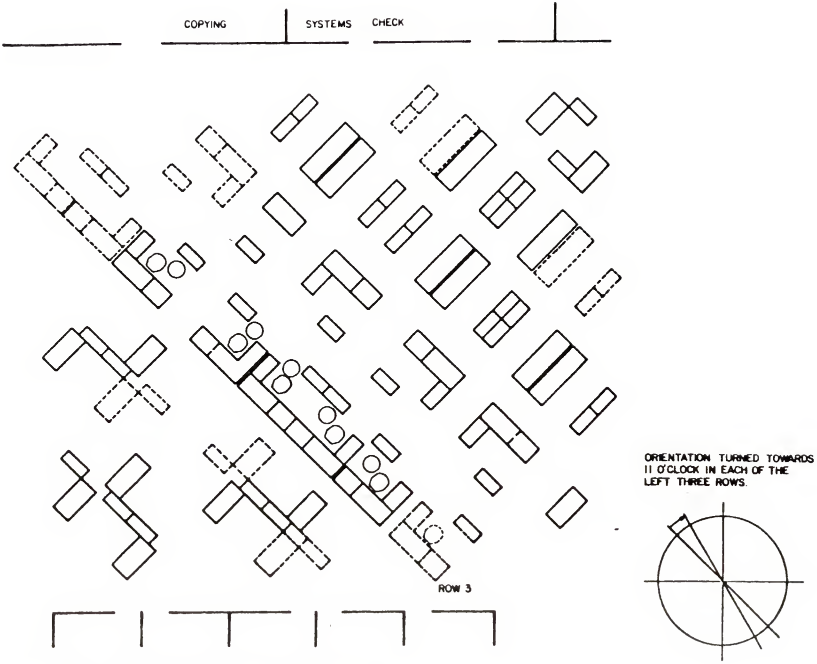
COPYING
SYSTEMS
CHECK
ROW 3
ORIENTATION TURNED TOWARDS 11 O'CLOCK IN EACH OF THE LEFT THREE ROWS.

Figure 4. Floor Layout of Hewlett-Packard.

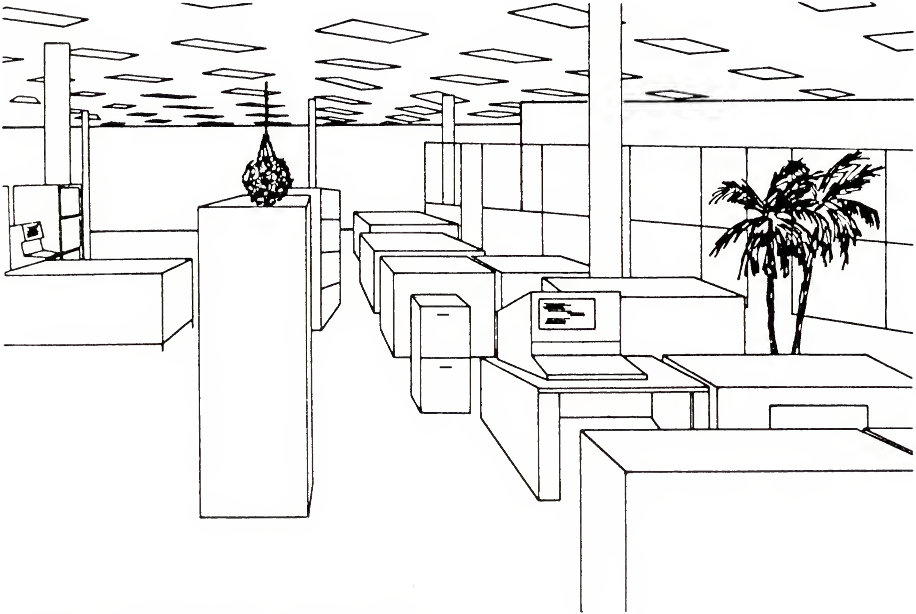

Figure 5. Perspective of Office--Hewlett-Packard.

Procedure

Permission to conduct the study was obtained from Ms. Joan Kollmann, personnel administrator. Questionnaires and cover letters (Appendix D) were distributed, with a verbal short explanation, to employees on two consecutive Mondays. Employees were urged to complete the forms that day but were given envelopes in which to mail them if they were necessary. A predetermined study-number card was included with each form and people were asked to write their names on the card and also to state whether they would agree to complete a second form in a few weeks for reliability-testing. Twenty-nine questionnaires were received for a 53% response rate. Of these 17 or 59% agreed to complete the questionnaire a second time. Approximately four weeks later a second questionnaire was mailed to those who had agreed, and eleven were returned.

Variables

The questionnaire used in Experiment Two was identical with that used in Experiment One at Time 3, with the addition of three questions. Two questions were asked on privacy issues: one on the amount of privacy to the job and one on the amount of personal privacy. The third additional question was on the amount of time spent in the workspace, since many of the employees often were out of the office.

CHAPTER III
RESULTS AND DISCUSSION

Reliability

Reliability of the questionnaire was measured in Experiment Two using the test-retest method. There were eleven subjects for the reliability check. Because of the small number, reliability was measured in several ways. First the answers on the subjective questions were totaled and the totals of the first and second testing were correlated. There was a significant relationship ($r = .617$, $p < .05$). Then a repeated measures ANOVA was performed on these totals. There was no significant difference between times ($F = .228$, $p = .643$). The reliability coefficient alpha was 0.763.

Secondly, correlations were obtained on the individual subjective items. Questions concerning perceived personal control, extent job performance was affected by others, feeling the workspace is really yours, satisfaction with workspace, level of morale, satisfaction with the level of socializing, satisfaction with the job, and amount of privacy for work were all significantly correlated at the two different times.

There were three questions which were not significantly correlated: perception of size of space, amount of personal privacy, and professional recognition by space (status). Caution will be exercised in conclusions made with these questions, but it seems likely that, had more subjects been available for the reliability tests, the questions on privacy and status, particularly, could have shown more reliability.

Results—Experiment One

Perceived Personal Control

Perceived personal control had been a priori conceptualized as relating to four specific aspects of the workspace: ability to keep people from coming into or passing through the workspace, ability to control unwanted interruptions, control over bothersome noise, and ability to arrange or rearrange the space. With the second questionnaire of repeat subjects deleted, answers to the above four questions on all three time-wave surveys were factor analyzed. The final solution showed just one factor, as expected, with an eigenvalue of 1.9. The correlations between each aspect and the factor of perceived control were

Coming into space	.78
Interruptions	.78
Noise	.52
Arrange Space	.62

Each aspect is highly correlated with perceived control, with both controlling interruptions and coming into the space loading most highly.

The variances on the four questions were also similar, allowing them to be considered as a unified concept for further analyses. Answers to all four questions were summed, giving each person a perceived personal control score. The possible range was from 0 to 20. A lower score indicates greater control. For the three surveys together, the mean perceived personal control score was 12.13 with a standard deviation of 3.47.

Time 1 data were not used for the following personal control analyses because of the problem of correlated error: most of Time 1 respondents also completed a Time 2 or Time 3 questionnaire. It would be possible to consider this group in a separate analysis but the number in each group is too small. The breakdown is as follows: Time 1 and 2 questionnaires--open office--8, conventional office--5; Time 1 and 3 questionnaires--open office--9, conventional office--5.

Since the test used at Time 2 and Time 3 is virtually identical, the error due to the test should be constant. There were four subjects who took both Time 2 and Time 3 tests, which may be of some concern because of correlated error. Three were in the open offices and one in the conventional.

An additional consideration is that arrangements in the offices at the time of survey 1 were not as clear as in the new office for the latter two surveys. The distinction between conventional and open offices is difficult in the case of smaller multi-person offices.

The following chart shows the breakdown of scores on perceived personal control. The scores were divided into thirds to arrive at the high, medium, and low categories.

TABLE 1

BREAKDOWN OF PERCEIVED PERSONAL CONTROL SCORES BY SURVEY

PERCEIVED CONTROL SCORE	HIGH					MEDIUM					LOW				
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SURVEY 2	0	4	0	0	0	1	2	1	1	1	0	6	5	4	1
SURVEY 3	1	2	0	2	0	5	3	3	3	3	3	5	1	7	0
TOTAL	1	6	0	2	0	6	5	4	4	4	3	11	6	11	1

Survey 2 Total=4 (15%) Survey 2 Total=6 (23%) Survey 2 Total=16 (62%)
Survey 3 Total=5 (13%) Survey 3 Total=17 (45%) Survey 3 Total=16 (42%)

Looking at both the time and office type dimensions, the data show the following pattern:

TABLE 2

MEAN CONTROL SCORES BY TIME AND OFFICE TYPE

	TIME 2	TIME 3
OPEN	MEAN = 14.19 (LOW PERCEIVED CONTROL) N = 16	13.29 (LOW PERCEIVED CONTROL) N = 24
CONVENTIONAL	6.0 (HIGH PERCEIVED CONTROL) N = 7	9.18 (MEDIUM PERCEIVED CONTROL) N = 11

Since the principal interest is in the differences between cells, not in the overall significance level, the perceived personal control construct was assessed using a multiple comparison t-test as suggested by Kirk (1968, pp. 71–78).

Hypotheses 1 and 2 were tested using two orthogonal comparisons. Because the variances at Time 2 and Time 3 were unequal, as well as those of open and conventional office types, the t was based on a separate variance estimate. The degrees of freedom reported were based on a formula for unequal group sizes. It was found that people in open offices (across time) perceive themselves significantly less able to exert personal control than those in conventional offices, $t(24.77) = 6.65$, $p < .0001$, as predicted in Hypothesis 1.

Hypothesis 2 was of a longitudinal nature: that perceived personal control would increase over time in open offices. This was not confirmed, $t(37.86) = 1.30$, $p < .1$.

Office type seemed to be the important variable in predicting perceived personal control. One post hoc non-orthogonal test was performed between the open and conventional designs at Time 3 because this probably reflected the final adjustment pattern more closely than Time 2. This difference between perceived control in the two office types was significant, $t(16.06) = 3.37$, $p < .001$.

Correlates of Perceived Personal Control

Data from all three survey times were used to determine general relationships among variables.

In order to determine the general aspects of the office environment to which perceived personal control is related, correlations were obtained between all of the following variables: workunit, location in the building, job classification, age, sex, length of employment, type of office, number with whom the workspace is shared, perceived personal control, feeling that the space is yours, satisfaction with workspace, level of morale, amount of socializing wanted, and satisfaction with job.

Seven of these variables correlated significantly with perceived personal control:

feeling the space is yours	r = .54, p < .0001
job classification	r = .53, p < .0001
satisfaction with space	r = .43, p < .0001
age	r = –.34, p = .001
number sharing office	r = .31, p = .002
type of office	r = –.25, p = .013
sex	r = –.23, p = .02.

These variables were entered in that order in a stepwise multiple regression analysis. A significant contribution was obtained for the first three variables: feeling the space is yours (_F_ (1, 93) = 58.76, _p_ < .01), job classification (_F_ (1, 93) = 33.6, _p_ < .01), and satisfaction with the workspace (_F_ (1, 93) = 13.05, _p_ < .01). Together they accounted for 51.7% of the variance. The regression formula for these three variables predicting perceived personal control showed the following statistics:

TABLE 3

OVERALL _F_ TEST FOR REGRESSION ON PERCEIVED CONTROL

MULTIPLE R	0.7187	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F	P
R^2	0.5165	REGRESSION	3	586.785	195.59	34.19	<.001
STANDARD ERROR	2.3916	RESIDUAL	96	549.255	5.72		

There were ten job classification categories. The two categories containing division and department heads (who also have private offices) had means in the high perceived control range. With the exception of two categories falling in the low medium range, the remaining job categories rated perceived personal control as low.

Satisfaction with the workspace differed significantly ($\underline{t}$ (52.83) = -8.74, $\underline{p} < .0001$) between those perceiving high and low personal control, with the high personal control group more satisfied. There was no difference between the high and low personal control groups on job satisfaction.

Personal Control Behaviors

The actual behaviors that people used to assert personal control were obtained at Time 1 (prior to the move) and Time 2 (one month after the move). These were elicited through two questions: "Please list the ways you control whether or not people come into your main workspace" and "Please list the ways that you control whether or not you are interrupted in your main workspace." In the test at Time 3 (six months after the move into the office) the actual behaviors given as answers at Times 1 and 2 were listed and respondents were asked to state whether they worked well, worked sometimes, or did not work. Statistical comparisons were not attempted between the individual behaviors because of the differences in methods of elicitation and the small numbers reported.

As can be seen in Table 4, for controlling coming into the workspace, closing the door was the most popular method, especially at Time 1. However, most people were in conventional offices, although usually sharing this space with several others. Apparently, when people have doors they will try to use them to keep people out.

TABLE 4

BEHAVIORS FOR CONTROLLING COMING INTO WORKSPACE

BEHAVIOR	OLD OFFICE	NEW OFFICE		TOTAL	PERCENTAGE USED OF TOTAL BEHAVIORS	NUMBER AT TIME 3 SAYING "DOES NOT WORK"
	TIME 1	TIME 2	TIME 3*			
CLOSE DOOR	14	2	6	22	26%	2
HAVE SECRETARY MONITOR	2	2	4	8	9%	3
CHANGE DESK ORIENTATION			1	1	1%	6
PLACE PHYSICAL BARRIER	1	5	6	12	14%	8
ASK PEOPLE NOT TO	2	2	7	11	13%	6
DO NOT DISTURB SIGN	2			2	2%	
DISCOURAGE CONVERSATION AND BE BUSINESSLIKE	1	1		2	2%	
IGNORE PEOPLE			11	11	13%	7
STAY BUSY AND BE BUSINESSLIKE	1		16	17	20%	4
TOTAL	23	12	51	86		

* TIME 3 AMOUNTS ARE THE SUM OF THESE RATED AS "WORKS WELL" AND "WORKS SOMETIMES".

At Time 2 in the new office building with both open and conventional offices, the most popular method was placing a physical barrier. Behaviors seemed to be more diversified at Time 3, with people reporting a variety of successful behaviors. Staying busy and being businesslike as well as ignoring people, were the two most popular methods. There were some people for whom even these methods did not work, though. Yet the clearly most popular ways to prevent people from coming into the workspace were to close the door and stay busy and be businesslike.

For controlling interruptions, as shown in Table 5, closing the door was again one of the most popular method, arising primarily from the availability of doors in the old building. When in the new building, respondents used more behaviors, for controlling coming into the space and used this variety with greater success. Time 3 shows an emergence of four behaviors which many people agreed worked: developing an understanding with others by asking them not to (interrupt), leaving the desk and working elsewhere, discouraging conversation and being businesslike, and keeping busy and being businesslike (by concentrating on work).

Taking the overall results, it appears that doors are useful for exerting personal control over an area. A closed door is a universally understood signal. Following this is just asking people not to do what they are doing and maintaining a businesslike demeanor by staying busy and concentrating on work. Those behaviors mentioned as not working at time 3 were changing desk orientation and ignoring people.

All behaviors were ranked twice by the researcher: on the social-environmental continuum and on the active-passive continuum. The criterion for "social" was that the person him- or herself has potential for an interaction. The active-passive differentiation was that "active"

TABLE 5

FREQUENCIES BEHAVIORS FOR CONTROLLING INTERRUPTIONS

BEHAVIOR	OLD OFFICE	NEW OFFICE		TOTAL	PERCENTAGE USED OF TOTAL BEHAVIORS	NUMBER AT TIME 3 SAYING "DOES NOT WORK"
	TIME 1	TIME 2	TIME 3*			
CLOSE DOOR	11	5	7	23	17%	2
HAVE SECRETARY MONITOR	4	1	7	12	9%	4
CHANGE DESK ORIENTATION	2	3	1	6	5%	6
DEVELOP UNDERSTANTING WITH OTHERS BY ASKING THEM NOT TO	3	3	16	22	17%	3
LEAVE DESK AND WORK ELSEWHERE	1	1	16	18	14%	2
DISCOURAGE CONVERSATION AND BE BUSINESSLIKE	3	1	14	18	14%	7
IGNORE PEOPLE	3	1	7	11	8%	7
KEEP BUSY AND BE BUSINESSLIKE (CONCENTRATE ON WORK)	3	2	17	22	17%	1
TOTAL	30	17	85	132		

* TIME 3 AMOUNTS ARE THE SUM OF THESE RATED AS "WORKS WELL" AND "WORKS SOMETIMES".

was a behavior done by the person him- or herself and it must be done repeatedly and be fairly obvious; "passive" is more unobtrusive and long-lasting. The behaviors were judged as

SOCIAL-ACTIVE

ask people not to (develop understanding by asking people not to)
discourage conversation and be businesslike
not answer phone

SOCIAL PASSIVE

ignore people
stay busy and be businesslike

ENVIRONMENTAL-ACTIVE

close door
leave desk and work elsewhere
"do not disturb" sign

ENVIRONMENTAL-PASSIVE

have secretary monitor
change desk orientation
place physical barrier

At Time 1, the predominant behavior was environmental-active, with closing the door accounting for most of the answers. Time 2 and Time 3 data will be discussed in more detail because they are pertinent to differences in office type.

Hypothesis 3 stated that people in open offices would use more social than environmental control behaviors, while those in conventional offices would use environmental rather that social behaviors. As shown in Table 6, in open offices, social-active and social-passive behaviors accounted for 70% of those reported, while environmental-active and

TABLE 6

CONTROL BEHAVIORS BY TIME AND OFFICE TYPES

	TIME 2				TIME 3				TOTALS
	SOCIAL ACTIVE	SOCIAL PASSIVE	ENVIRONMENTAL ACTIVE	ENVIRONMENTAL PASSIVE	SOCIAL ACTIVE	SOCIAL PASSIVE	ENVIRONMENTAL ACTIVE	ENVIRONMENTAL PASSIVE	
OPEN	5	3	1	8	26	39	14	9	SOC.-ACT. = 31 (30%) SOC.-PAS. = 42 (40%) ENV.-ACT. = 15 (14%) ENV.-PAS. = 17 (16%)
	(29%)	(18%)	(6%)	(46%)	(30%)	(44%)	(16%)	(10%)	
		TOTAL = 17				TOTAL = 88			
	SOCIAL = 8 (47%) ENVIRONMENTAL = 9 (53%)		ACTIVE = 6 (35%) PASSIVE = 11 (65%)		SOCIAL = 65 (74%) ENVIRONMENTAL = 23 (26%)		ACTIVE = 40 (45%) PASSIVE = 48 (55%)		TOTAL = 105
CONVENTIONAL	1	0	6	3	12	12	15	10	SOC.-ACT. = 13 (22%) SOC.-PAS. = 12 (20%) ENV.-ACT. = 21 (36%) ENV.-PAS. = 13 (22%)
	(10%)	(0%)	(60%)	(30%)	(24%)	(24%)	(31%)	(20%)	
		TOTAL = 10				TOTAL = 49			
	SOCIAL = 1 (10%) ENVIRONMENTAL = 9 (90%)		ACTIVE = 7 (70%) PASSIVE = 3 (30%)		SOCIAL = 24 (49%) ENVIRONMENTAL = 25 (51%)		ACTIVE = 27 (55%) PASSIVE = 22 (45%)		TOTAL = 59
TOTALS	6 (22%)	3 (11%)	7 (26%)	11 (41%)	38 (28%)	51 (37%)	29 (21%)	19 (14%)	
		TOTAL = 27				TOTAL = 137			

passive were 30%. This difference was statistically significant ($\underline{X}^2 = 4.20$, $\underline{p} < .05$). Conventional offices showed the reverse pattern with environmental behaviors being used more frequently than social. This was also a significant finding ($\underline{X}^2 = 7.49$, $\underline{p} < .01$). Hypothesis 3 was supported.

The combined results of Hypotheses 3 and 4 were expected to obtain the following:

TABLE 7

EXPECTED BEHAVIORS BY TIME AND OFFICE TYPE

OFFICE TYPE	TIME 2	TIME 3
OPEN	SOCIAL BEHAVIORS ACTIVE	SOCIAL AND ENVIRONMENTAL BEHAVIORS PASSIVE
CONVENTIONAL	ENVIRONMENTAL BEHAVIORS ACTIVE	ENVIRONMENTAL BEHAVIORS ACTIVE

The data indicate that for open offices the reverse actually was true: at Time 2 people were using all kinds of behaviors to exert personal control (47% social and 53% environmental), while at Time 3, they seem to have settled into a more social-interaction pattern. The data show that at Time 2 just after moving, the environmental behaviors used most were changing desk orientation and placing a physical barrier. By their very nature, these behaviors are self-limiting. (How many times and ways can a desk be reoriented?) By Time 3 people were reporting that changing the desk orientation and physical barriers didn't work. The nature of the data does not allow saying whether they never did work or no longer work. However, for open offices there were several reports of using a physical barrier to control coming into space, but it was no longer the preponderant one. The overwhelming environmental behavior to control interruptions in open offices was to leave and work elsewhere. Environmental behaviors shifted from passive to active in open offices while social behaviors showed an increase in both active and passive, with slightly more of the latter.

Conventional office inhabitants used mostly environmental and passive behaviors (accounted for largely by closing the door) at Time 2. By Time 3, conventional offices show almost equal social and environmental behavior. The active and passive behaviors also became more equal, although slightly more active. The predicted change in the open office, from active to passive, did not occur ($\underline{x}^2 = 1.039$ not significant). The overall difference between office types was also not significant ($\underline{x}^2 = 2.888$). Hypothesis 4 was not supported by the data. The data pattern shows the following:

TABLE 8

CATEGORIES OF PERCEIVED CONTROL AND BEHAVIORS BY TIME AND OFFICE TYPE

OFFICE TYPE	TIME 2	TIME 3
OPEN	SOCIAL AND ENVIRONMENTAL (LOW PERCEIVED CONTROL)	SOCIAL (LOW PERCEIVED CONTROL)
CONVENTIONAL	ENVIRONMENTAL (HIGH PERCEIVED CONTROL)	SOCIAL AND ENVIRONMENTAL (MEDIUM PERCEIVED CONTROL)

It was planned that people would be "typed" according to the personal control behaviors they utilized, and that they would be compared across times to see if there were changes in behaviors used to cope with environmental change. However, because of the small number of repeated subjects and the small number of behaviors reported, attempts at conclusions about changes in coping styles were fruitless.

Social Facilitation

It was expected that social facilitation aspects of the work environment would be related to job tasks, in that those doing difficult tasks would find the presence of others a distraction, while those doing routine tasks would enjoy the presence of others. Specifically, hypothesis 5 stated that those in the open office sections who were professionals would feel that the presence of others negatively affected their work performance compared with professionals in conventional offices, who would presumably be insulated from others. People whose jobs fall within categories requiring either graduate school education or advanced experience were classed as professionals. Professionals in open and conventional offices at both Times 2 and 3 were compared for their ratings of work interference using t tests. No differences between the office type groups were found, with most professionals attributing negative effects from others.

One post hoc test was carried out on the Time 3 data (felt to be more representative of the long-term adjustment) between the professionals and non-professionals in the open offices. Professionals in open offices expressed significantly more negative interference than non-professionals (t (15.81) = 1.76, $p < .05$). A MANOVA on effect on performance using type office and job classification showed a significant main effect for job only ($F(1,30) = 3.017$, $p <$ (.05).

Hypothesis 5 was not supported because the type of office made no difference in the level of interference reported by professionals from the presence of others; the difference was in the job classification and, hence, the duties performed. This seems to support the general social facilitation theory as it relates to job tasks, regardless of office environment.

Status

Another subtle nuance of office design is the professional recognition or status support it carries. Hypothesis 6 states that the professional group will feel that the open office space does not give them the professional recognition, compared with non-professionals in the open office, while all levels in the conventional office section, with its clear-cut status differentiation, will feel that they do receive the recognition associated with their positions. This was measured at Time 3 only.

TABLE 9

PROFESSIONAL AND NON-PROFESSIONAL RATINGS
OF PROFESSIONAL RECOGNITION BY OFFICE
IN OPEN AND CONVENTIONAL OFFICES

OFFICE TYPE	PROFESSIONAL	NON-PROFESSIONAL
OPEN	M = 2.83* N = 6	3.06 (LOWEST) N = 17
CONVENTIONAL	1.43 (HIGHEST) N = 7	2.25 N = 4

* LOWER SCORE SIGNIFIES HIGHEST PROFESSIONAL RECOGNITION

Two t-tests assessed the difference between the professionals and non-professionals in the open and conventional offices and showed no differences due to job category.

A post hoc MANOVA on status using office type and job category showed only the main effect of office type to be significant ($\underline{F}$ (1,31) = 19.83, $\underline{p} < .0001$).

The interaction effect between professional or non-professional job categories and office design predicted by hypothesis 6 was not supported by the data. The main effect of office design accounted for the reported differences in professional recognition provided by the office space.

An alternative way to investigate hypothesis 6 was to look at the general location within the building by status recognition. The building's north side is of a conventional layout, with administrative professionals in private offices and clerical staff in unenclosed sections outside the private offices. The south side of the building is a mixture, with administrative professionals in private offices and both clerical and other professionals and non-professionals in open areas (see Figure 2). A t-test was conducted on the status ratings of both sections, regardless of job code. A significant difference was found between the two locations ($t = -2.20$ (27), $p < .02$), with those in the conventional layout giving their spaces a better status recognition rating than the open sections.

Other office variables were significantly related to status recognition ($n = 35$): satisfaction with the space ($r = .68$, $p < .0001$); perceived control ($r = .60$, $p < .0001$); feeling the space is really yours ($r = .59$, $p < .0001$); morale ($r = .55$, $p < .0001$); type of office ($r = -.48$, $p = .002$); satisfaction with the job ($r = .31$, $p = .040$).

Socializing

Hypothesis 7 anticipated that those in open offices would be dissatisfied with the amount of socializing (a common problem in open offices) and wish for less. This was not confirmed. Workers in both open and conventional offices wished the level of socializing to remain the same.

Morale

Morale is another general indicator which was expected to show an interaction between office design and time. Hypothesis 8 deals with the levels of morale as well as the attribution of the causes of the stated level of morale. Those in open offices were hypothesized to rate morale as lower than those in conventional offices. By the last survey (six months), morale was expected to rise in the open offices and be more similar across office types.

TABLE 10

LEVEL OF MORALE BY THE TIME AND OFFICE TYPE

OFFICE TYPE	TIME 1*	TIME 2	TIME 3
OPEN	M = 3.13 N = 38	2.69 N = 16	3.26 (LOWEST) N = 23
CONVENTIONAL		2.29 (HIGHEST) N = 7	2.45 N = 11

* AT TIME 1 IN THE OLD BUILDING OFFICES WERE NOT OF THE DIFFERENT DESIGNS

As shown in Table 10, morale at Time 1 was relatively low. T-tests were conducted to test the differences hypothesized for Times 2 and 3. The expected difference between office types just after the move (Time 2) did not occur. Both groups averaged ratings between "somewhat high" and "neither." The expected rise in morale as behavior patterns and norms became more stabilized by six months did not occur. The level of morale actually dropped across groups, with the people in the open offices now rating morale as lowest. Instead of a general high level of morale across groups, as predicted, the difference between morale ratings by the office types was significant (t (31.19) = 2.42, $p < .02$).

Hypothesis 8 also stated that the level of morale would be attributed more to the building at Times 1 and 2, with the building becoming less salient over time and by Time 3 given less influence upon morale. Subjects were asked: "to what extent (in percentage) do you feel this level of morale is because of each of the following: the employees, the administration, this building." Most subjects' percentages totaled 100%. Table 11 shows the mean percentages attributed in each category.

TABLE 11

MORALE ATTRIBUTIONS BY TIME AND OFFICE TYPE

	EMPLOYEES		ADMINISTRATION		BUILDING	
	OPEN	CONVENTIONAL	OPEN	CONVENTIONAL	OPEN	CONVENTIONAL
TIME 1	44.78		37.97		37.69	
TIME 2	32.18	41.0	35.91	25.00	29.55	34.00
TIME 3	39.83	42.78	38.61	36.11	21.56	21.11

Using a MANOVA for the attribution categories (the employees, the administration, and the building), no multivariate effects were shown, using office type (coded for Times 2 and 3 only), and time as the independent variables. However, in the univariate tests, a significant effect was found for time on "this building" category ($\underline{F} = 6.11$, $\underline{p} < .02$). This was the only significant finding.

Although the attribution of level of morale to the building was not higher than the other categories at Times 1 and 2, it was as high as the other categories, attesting to the building environment's importance in the minds of the employees. As predicted, this saliency dropped by six months after the move, as subjects became adapted to the change in environments.

Satisfaction with Workspace

Hypothesis 9 states that workers in open offices will be more dissatisfied with their workspaces than those in conventional ones.

Results were as predicted (t (53.51) = 5.52, $p < .0001$). The open office mean was 3 on a 5-point scale; the conventional office mean was 1.3, expressing satisfaction. Longitudinally, it was also expected that satisfaction with open offices would increase by Time 3 as behaviors became normative and refrozen. However, there was no difference in open offices over time, subjects remaining dissatisfied with that design.

Correlates of Satisfaction with Workspace

Data from all three survey times were used to determine general relationships among variables. Satisfaction with the workspace was significantly correlated with seven variables that could explain the aspects of the work environment which lead to a feeling of satisfaction with one's workspace:

the feeling that the space is really yours	$r = .56$, $p < .0001$
perceived control	$r = .43$, $p < .0001$
morale	$r = .4$, $p < .0001$
type of office	$r = -.32$, $p = .001$
Satisfaction with job	$r = .26$, $p = .01$
number sharing space	$r = .25$, $p = .01$
workunit	$r = .23$, $p = .02$

These variables were entered into a stepwise regression analysis. Two variables were found to be significant at $p < .01$: feeling the space is yours, F (1,92) = 52, and morale, F (1,92) = 7.3. Together they account for 36% for the variance. However, the first variable accounts for so much of the variance (31%) that it is the best predictor. The statistics for the regression formula for this one variable are

TABLE 12

OVERALL *F* TEST FOR REGRESSION ON SATISFACTION WITH WORKSPACE

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	*F*	*P*
MULTIPLE R	0.56						
R^2	0.31	REGRESSION	1	67.64	67.64	44.41	$<.001$
STANDARD ERROR	1.23	RESIDUAL	98	149.27	1.52		

Hypotheses 10 and 11 state that satisfaction with the main workspaces would be highly correlated with peoples' perceptions of their abilities to exert personal control over their spaces and with the feeling the space is really theirs. These two variables were the two most highly related to satisfaction with space. These hypotheses were confirmed.

Personalization of Space

Hypothesis 12 states that personalization of space will correlate highly with satisfaction with workspace and feeling that the space is theirs. Personalization of space was measured using photographs of workspaces in conjunction with Time 1 and 3 surveys. Three persons rated the objects in the pictures as fitting into seven predetermined categories. A portion of the photographs was rated by more than one coder. The interrater reliability was calculated from the overlap in the scores using Pearson Product Moment correlations. All three sets of ratings were highly correlated: coders 1 and 3 : $r = .85$, $p < .0001$; coders 1 and 2 : $r = .92$, $p < .0001$; and coders 2 and 3 : $r = .80$, $p < .0001$. For all further analyses the duplicates were randomly removed so that each subject was represented only once.

The coding categories were 1) Personal Relationships, 2) Values-Self-expression, 3) Beautification-Decoration, 4) Humor, 5) Personal

Use Products, 6. Messages to Others, and 7. Uncodable. Pearson Product-Moment correlations were conducted on the categories. Only one relationship was found, that one between beautification-decoration and personal use products (r = .33, p = .023). Because this was a weak correlation, the categories were considered separately. Beautification-Decoration and Personal Use Products were the most frequent personalizers followed by Personal Relationships, Values-Self-Expression, Humor and Messages to Others.

Figure 6 gives an example of category 2 (Values-Self-Expression) with the bicycling poster. Figure 7 shows category 3 (Beautification-Decoration) with several photographs and category 5 (Personal Use Products) with a coffee-maker and a cigarette smoke diverter. Personal Relationships examples are in Figure 8 with children's photographs; the coffee cup is a Personal Use Product; and the statue and wall hanging are examples of Humor. Figure 9 shows another Humor example in the sign. Those four photographs are examples of the workspaces at Time 1 in the old building.

Figures 10 to 17 are photographs in the new building at Time 3, six months after moving in. Figure 10 photograph contains examples of category 3 (Beautification-Decoration) in the wildlife pictures and category 4 (Humor) in the cartoons. Figure 11 contains Values-Self-Expression (poster), Beautification-Decoration (pictures and plant), and Humor (cartoon). Figure 12 also contains plants for Decoration and Beautification. Plants again are in Figure 13, as well as Personal Relationship photographs, and decorative pictures. A trophy on top of the bookshelf is an example of Values-Self-Expression in Figure 14. Cards on the file cabinet and a figurine on the desk in Figure 15 show the

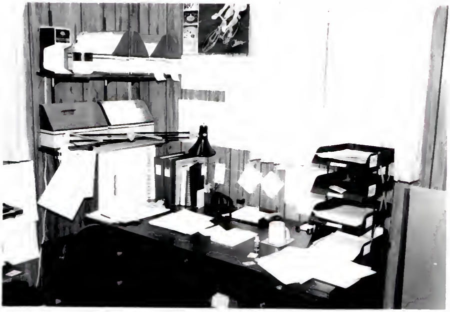

Figure 6. Workspace, Time 1 (Prior To Move).

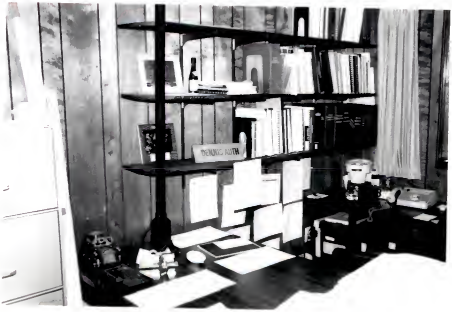

Figure 7. Department Director's Workspace, Time 1.

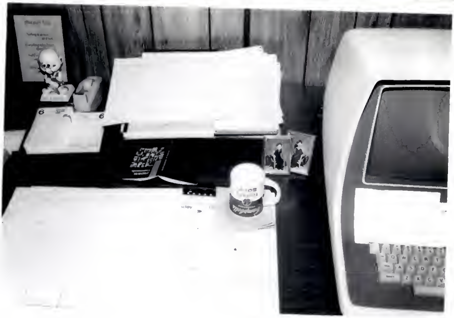

Figure 8. Clerical Workspace, Time 1.

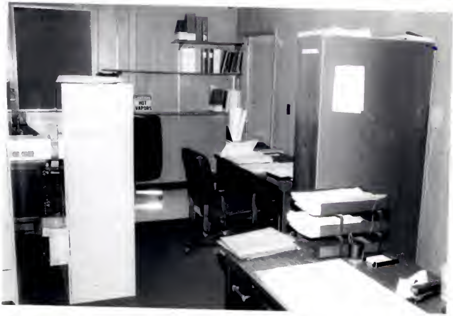

Figure 9. Shared Office, Time 1.

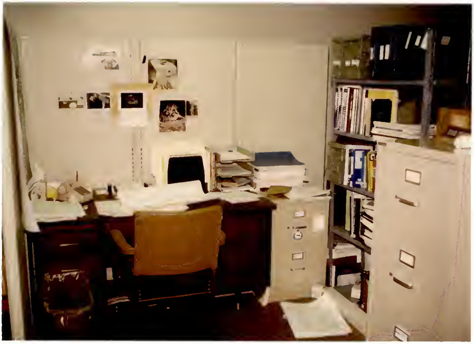

Figure 10. Open Office, Time 3.

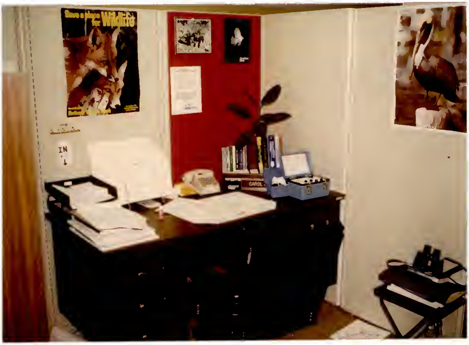

Figure 11. Open Office, Time 3.

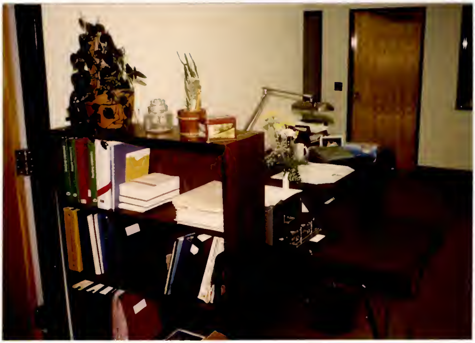

Figure 12. Secretarial Workspace, Conventional Section, Time 3.

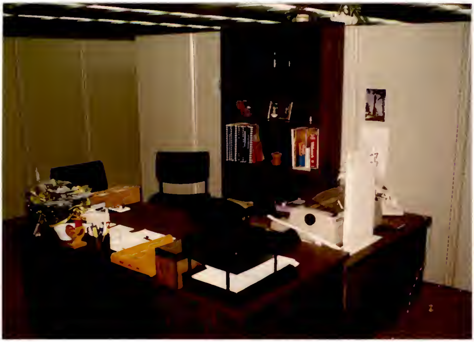

Figure 13. Secretarial Workspace, Open Office Section, Time 3.

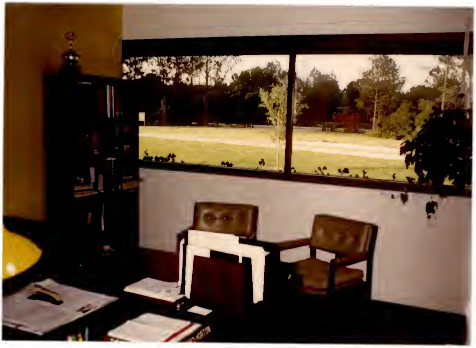

Figure 14. View 1, Department Director's Office Conventional Section, Time 3.

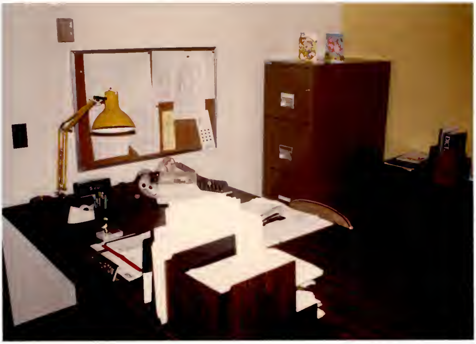

Figure 15. View 2, Department Director's Office Conventional Section, Time 3.

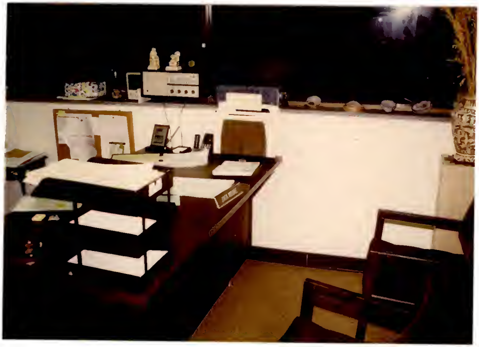

Figure 16. Division Director's Office
Open Section, Time 3.

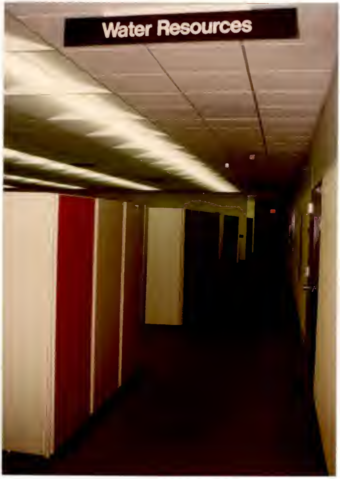

Figure 17. Hall and Entrance to an Open Office Section.

Decoration category. In Figure 16, the rocks and vase with dried plants are Decoration, the figurines are Humor, and the jar of candy, radio, and calculators are Personal Use Products.

The change in photographic method from black and white prints to color slides was made to increase clarity, with the projection of the slide. Apparently this was successful because the number of "uncodable" objects decreased in Time 3 (48 to 21). Numbers of objects in each other category rose in Time 3. The question may be asked whether this reflects an increase in personalizing at Time 3 or an improvement in method. The total number of coded personalizations at Time 1 was 202 and at Time 3 was 245. A t-test was performed for all categories and the totals; no difference across times was found for any category. It seems the increase resulted from improved clarity and the new office environment had no effect on personalizing behavior. (All analyses use only those subjects who had completed survey forms). Since there was no difference, the two times were considered one group for further analyses.

To test Hypothesis 12 on the relation between personalizing space and satisfaction with the space, as well as feeling the space is theirs, analysis of variance was performed. There was no significant effect due to either variable. Hypothesis 12 was not confirmed. Satisfaction with job was also tested and no effect was found.

To explore any further relationships in the data, several post-hoc tests were carried out. Levels of perceived control, job category (professional, non-professional) and sex were tested with t-tests for each category and the totals.

There were few significant differences. Level of perceived control differentiated the Beautification-Decoration category ($\underline{t}$ (5.45) = 3.23,

$p = .023$). Non-professionals used more humor type personalizations (t (7) = -2.65, $p = .033$). Also, women had a greater total of personalizations than men (t (43.70) = 2.63, $p = .012$).

Personalizing of space in an office setting does not seem to be strongly related to any psychological-environmental aspect addressed in this study. It may be more dependent upon personality.

Job Satisfaction

Hypothesis 13, that satisfaction with the workspace and satisfaction with the job would be moderately positively correlated, was confirmed ($r = .26$, $p < .01$).

Job satisfaction was also significantly correlated with morale ($r = .33$, $p = .01$).

Attribution of Job Satisfaction

The overall level of job satisfaction was high: the mean 1.53 was in the middle of "satisfied" and "somewhat satisfied." There was no marked difference in satisfaction when broken down by workunit or by job category.

The source of job satisfaction was expected to differ with the level of satisfaction. Specifically, hypothesis 14 stated that those who were satisfied with their jobs would attribute the satisfaction to themselves, while those who were dissatisfied would attribute it to external causes. Subjects were asked to partition their level of satisfaction among four causes: "yourself, the other employees, the administration and this building." Table 13 shows the percentages attributed to these categories by employees with varying job satisfaction.

Analysis of variance was performed on the four attribution categories. Two were found to vary significantly with level of job

TABLE 13

ATTRIBUTION OF JOB SATISFACTION BY THOSE SATISFIED AND DISSATISFIED WITH JOB

	YOURSELF	OTHER EMPLOYEES	ADMINISTRATION	BUILDING
SATISFIED *	M = 46.33% N = 75	27.48% N = 69	22.92% N = 66	17.83% N = 47
NEUTRAL	54.50% N = 2	0	45% N = 2	66.33% N = 3
DISSATISFIED **	7.50% N = 2	10.00% N = 2	79.80% N = 5	16.25% N = 4

* Collapsing of Answers "Satisfied" and "Somewhat Satisfied"
** Collapsing of Answers "Somewhat Dissatisfied" and "Dissatisfied"

satisfaction: "yourself" (F (1) = 5.8, $p < .02$) and "the administration" (F (1) = 54.8, $p < .0001$).

In specifically testing hypothesis 14, a t-test between those reporting to be satisfied and dissatisfied (again using categories collapsed) on the "YOURSELF" attribution showed a significant difference (t (68) = 11.25, $p < .0001$). Hypothesis 14 was supported.

Absenteeism

Absenteeism is an indicator often used in business to verify satisfaction in the workplace. In this experiment, aggregate data were unavailable. Therefore, ten employees were selected and annual and sick leave for each were charted for two years before and two years after the move to the new office environment.

An analysis of variance was performed separately for sick and annual leave. No difference was found for either type of leave between the two time periods before and after the move.

Results—Experiment Two

Perceived Personal Control

Perceived control was conceptualized using the same variables as in Experiment One: ability to keep people from coming into a passing through your workspace, ability to prevent unwanted interruptions, control over bothersome noise, and being able to arrange or rearrange the workspace.

Again, a factor analysis was run to determine if, in this office design, the factor was the same. A one-factor solution, with an eigenvalue of 1.696, resulted. The correlation between variables and the factor of perceived control were

COMING INTO SPACE	.62
INTERRUPTIONS	.79
NOISE	.74
ARRANGE SPACE	.38

In this pool or "bullpen" office, controlling unwanted interruptions and noise were most highly correlated with perceived personal control. The mean score on the total of the four questions was 13.32, a standard deviation of 2.597 (N = 28).

Answers to all four perceived control questions were summed, as in Experiment One, to arrive at a composite score. For the Hewlett-Packard setting the range was

TABLE 14

FREQUENCIES OF INDIVIDUAL PERCEIVED CONTROL SCORES

TOTAL PERCEIVED CONTROL SCORE

	MEDIUM					LOW					
0	8	9	10	11	12	13	14	15	16	 20	TOTAL 28
FREQUENCY	2	1	2	2	2	4	3	4	8		
TOTAL			9				19				

For comparison purposes, the low, medium, and high distinction made in Experiment One was retained. No subject rated the perceived personal control dimension as high; nine rated it as medium; and nineteen rated it low.

Making a distinction between office types in this study was not possible, since only two of the respondents were not housed in the open, "bullpen" portion of the room. These two were in the side, partially enclosed offices. The mean rating on perceived control for these two was 9.0 with a standard deviation of 1.4, while the mean of the open section was 13.96 with a standard deviation of 2.1. Hypothesis 1 was confirmed, in that this open office group mean fell in the low range on perceived personal control.

Since it was not possible to show a significant difference based on "office type" in this study, all subjects were treated as one group.

Correlates of Perceived Personal Control

Again, correlations among general workspace attributes were obtained. Three additional questions were added on work-related and personal privacy which were not in Experiment One, as well as time spent in the office.

Those variables significantly related to perceived personal control were

feeling the space is really yours	r = .6, p = .001
type office	r = –.55, p = .002
work-related privacy	r = .54, p = .002
personal privacy	r = .42, p = .014
age	r = –.39, p = .02.

These were entered in a stepwise multiple regression analysis. A significant contribution was made by only one variable—feeling the space is really yours (F (1,22) = 26.72, p = .01). It explained 46% of the variance. The regression model for predicting perceived personal control from feeling the space is yours showed the following statistics:

TABLE 15

OVERALL F TEST FOR REGRESSION ON PERCEIVED CONTROL

MULTIPLE R	0.68	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F	P
R^2	0.46	REGRESSION	1	83.67	83.67	22.1	<.01
STANDARD ERROR	1.9	RESIDUAL	26	98.43	3.79		

This regression analysis had only twenty-eight subjects; thus the results will be viewed cautiously.

Because there were no ratings in the high perceived category, those rating control as medium and low were compared on certain variables related to control. For both satisfaction with space and satisfaction with job, there was no statistically significant difference. Both groups seemed pretty well satisfied on these aspects even with the low perceived control rating. However, both privacy questions showed a difference between the perceived control groups. There was a significant difference on ratings of work-related privacy (t (26) = -2.90, p = .007) with those perceiving low control reporting less privacy. (The negative t value is because of reversed scoring.) This same pattern was also shown for personal privacy (t (26) = -2.36, p = .026).

Job categories in this setting were divided into clerical and non-clerical. The fairly strict definition of "professional" used in Experiment One did not apply since there were a variety of backgrounds doing similar jobs. However, the dichotomy is somewhat analogous to job tasks, since clerical still do a majority of routine tasks compared to the non-clerical. In the case of perception of personal control, job category made no difference. Both clerical and non-clerical subjects felt low control (13.7 and 13.1 respectively).

Personal Control Behaviors

The behaviors people use to assert personal control in their spaces were obtained from Experiment One and were used in the same format as questionnaire 3: the behaviors were listed and respondents were asked to state whether they worked well, worked sometimes, or did not work.

Table 16 shows that for controlling coming into or passing through space, keeping busy worked best. Many more behaviors were enlisted by subjects to control unwanted interruptions than passing through. The ones used most successfully were asking people not to (developing understanding with them), leaving the desk and working elsewhere, and keeping busy. There was no unanimous agreement that any behavior worked all the time or worked for everyone, however.

TABLE 16

FREQUENCIES OF CONTROL BEHAVIORS

BEHAVIOR	WAYS OF CONTROLLING COMING INTO OR PASSING THROUGH WORKSPACE		WAYS OF CONTROLLING UNWANTED INTERRUPTIONS	
	WORKS	DOES NOT WORK	WORKS	DOES NOT WORK
CLOSE DOOR	NOT APPLICABLE		NOT APPLICABLE	
HAVE SECRETARY MONITOR[1]	2	2	5	2
CHANGE DESK ORIENTATION[1]		2		2
LEAVE DESK AND WORK ELSEWHERE[2]			11	2
PLACE A PHYSICAL BARRIER[1]	3	2		
ASK PEOPLE NOT TO (DEVELOP UNDERSTANDING WITH OTHERS)[3]	3	3	13	2
DISCOURAGE CONVERSATION[3]			6	1
IGNORE PEOPLE[4]	4	3	2	3
KEEP BUSY[4]	11	3	10	4
DO NOT ANSWER PHONE[4]			4	3

[1] ENVIRONMENTAL-PASSIVE
[2] ENVIRONMENTAL-ACTIVE
[3] SOCIAL-ACTIVE
[4] SOCIAL-PASSIVE

Behaviors were rated by the same procedure as in Experiment One on the Social-Environmental and Active-Passive dimensions. The ratings on the most used behaviors are

keeping busy: social-passive
asking people not: social-active
leave desk and work elsewhere: environmental-active

It appears that in this open office, hypothesis 3 was confirmed: 71.6% of the behaviors reported as working were social behaviors. However, 64.7% of those behaviors not working were also social. This shows that more social solutions are attempted in the first place in open offices.

Social Facilitation and Performance

In general, those in the open office were about equally divided on the effects of others on their work performance: eleven answered that others affected it positively, seven said no effect, and seven answered negatively. The only general workspace attribute to which performance was significantly correlated was work-related privacy (r = .42, p = .016).

Type of job did not significantly affect the social facilitation aspects of the presence of others. In fact, the clerical positions were more neutral in ratings, while the non-clerical staff was more positive about the effects of others. This may be related to the fact that the non-clerical staff spends more time out of the office. For this reason, this setting was probably not a valid test of hypothesis 5, which stated that professionals would report a higher level of interference from others.

Status

Status or professional recognition related to the workspace was significantly related to satisfaction with the workspace ($r = .582$, $p = .001$), personal privacy ($r = .36$, $p = .039$), and work privacy ($r = .34$, $p = .048$).

The mean rating for status was 2.16, with a variance of .72. This was on a 4-point scale. When broken down by job category, the clerical group were slightly more satisfied than non-clerical, but not significantly so.

Hypothesis 6, which states that the professional group will feel that the open office space does not give them the professional recognition, compared with non-professionals in the open office, was not supported.

Privacy

Questions were asked on this survey concerning two privacy issues: privacy to do your job and personal privacy. Work privacy was shown to be significantly related to the following work aspects: extent to which you feel the space is really yours ($r = .727$, $p < .0001$), personal privacy ($r = .603$, $p < .0001$), satisfaction with the space ($r = .5677$, $p = .001$), perceived control ($r = .539$, $p = .002$), others affecting performance ($r = .42$, $p = .016$), time spent in the office ($r = .412$, $p < .018$), and status ($r = .34$, $p = .048$). Again, the number of subjects was only twenty-eight.

The coding of time spent in the office was such that more time in the office actually meant less work-related privacy. The majority of the non-clerical staff spent most of their working time out of the office. Apparently, they did not find the office situation as bothersome, since they were able to do their work in alternative environments.

Personal privacy was most highly related to work privacy ($r = .60$, $p < .0001$), feeling the space is yours ($r = .57$, $p = .001$), satisfaction with the workspace ($r = .53$, $p = .002$), perceived control ($r = .42$, $p = .014$), sex ($r = .41$, $p = .018$), status ($r = .36$, $p = .039$), and age ($r = -.32$, $p = .047$). Because of scoring, the age correlation actually reads that older people felt the most personal privacy, while the younger ones did not feel very much privacy. The correlation for sex meant the men felt least personal privacy.

Work-related privacy had a mean rating of 3.04 on a 4-point scale, with four as the least. Personal privacy was rated at 3.36 on the same scale. There was no difference between the job categories on ratings.

It appears most people were dissatisfied with privacy aspects of this office. Personal privacy was found to be particularly lacking, according to the ratings.

Time in the Office

Most of the employees did not spend their entire working time at their office. Only nine of the 28 respondents spent a five-day week in the main office. The breakdown of days spent in the office was one day, 4; two days, 7; three days, 4; four days, 3; and five days, 9.

Socializing

Hypothesis 7 stated that those in the open office would like less socializing. This was not confirmed: 92.6% of the respondents wished the same level of socializing and 7.4% actually wished for more.

Morale

The mean level of morale reported was 1.63 on a 5-point scale, which was fairly high. The mean levels attributed to each cause were employees, 53.54%; the administration, 29.71%; and the building, 21.5%.

The section of hypothesis 8 which is applicable to this study, is that the environment or building is less salient than other aspects when there is not something (such as a change in settings) to make it so. This appears to be the case in the lower rating given to the building.

Satisfaction with Workspace and Correlates

For the most part, subjects expressed satisfaction with their spaces (mean 2.1 on a 5-point, scale variance 1.8). Satisfaction with the workspace was significantly correlated with six variables. These are (in order of correlation)

feeling the space is yours	$r = .63$, $p < .0001$
status	$r = .58$, $p = .001$
work-related privacy	$r = .57$, $p = .001$
personal privacy	$r = .53$, $p = .002$
morale	$r = .43$, $p = .013$
sex	$r = .39$, $p = .024$

These variables were entered into a stepwise regression analysis in that order. Three variables were found to be significant: feeling the space is yours ($F\ (1,21) = 14.9$, $p < .01$), morale ($F\ (1,21) = 8.79$, $p < .05$), and work privacy ($F\ (1,21) = 7.69$, $p < .05$). Together they accounted for 52% of the variance.

The regression equation was not tested because the results based on these predictors, using a small number such as twenty-eight, are inconclusive.

Hypothesis 10 was not confirmed because satisfaction with the workspace was not correlated with perceived control over space.

Satisfaction with space and job were not significantly correlated in this setting, disconfirming hypothesis 13.

Attribution of Job Satisfaction

The overall level of job satisfaction was high, with a mean of 1.3 on a 4-point scale. There was no significant difference between job category. The only variable shown to be related to job satisfaction was morale ($r = .46$, $p = .008$).

The source of job satisfaction was expected to differ with the level of satisfaction. Hypothesis 14 predicted that those who were satisfied with their jobs would attribute the satisfaction to themselves, while those who were dissatisfied would attribute it to external causes. Subjects were asked, as before, to partition their level of satisfaction among "yourself, the other employees, the administration and this building."

Only one employee expressed dissatisfaction with the job. Everyone else was "satisfied" or "somewhat satisfied." Since hypothesis 14 could not be fully tested, the part pertaining to satisfied employees was explored. The mean level of satisfaction attributed to the four sources was as follows:

YOURSELF, 49.35%; OTHER EMPLOYEES, 27.12%;

THE ADMINISTRATION, 20.38%; THIS BUILDING, 11.67%.

The hypothesis was confirmed in that the satisfied employees attributed more causation to themselves. The environment was again least salient.

Comparison of Results of Experiments One and Two

The expected personal control factor did emerge in both studies. The relation between the variables and the factor showed that controlling interruptions was most highly related with the factor:

	EXPERIMENT ONE	EXPERIMENT TWO
coming into space	.78	.62
interruptions	.78	.79
noise	.52	.74
arranging space	.62	.38

In the open office with barriers (Experiment One), people were equally as concerned about traffic into and through their spaces. In the "bullpen" pool office (Experiment Two), controlling noise was the second most important. Here, too, arranging space was less related to control, possibly because the employees were not allowed much freedom to do this by company policy, taking it somewhat out of the sphere of active personal control.

Using the composite scores of these four variables, level of perceived personal control was predicted by office type. Those in conventional offices perceived more control and those in all open offices perceived significantly less control in their workspaces.

When looking at office design effects for Experiment 1, the results of survey time 3 (at six months after the move) will generally be used for comparison purposes. Probably this is more representative of the final adjustment patterns, considering that time 2 was only one month after the move to the new office. At time 3, after six months, the environment had become less salient and intrusive and routine patterns had developed.

Thus, time 3 of Experiment 1 will be compared with Experiment 2. At time 3, mean perceived control was rated as 13.29 in the open paneled office; in Experiment 2, in the open, pool design, perceived control was 13.96. The conventional office rated perceived control at 9.18, a significant difference from the open office.

It appears that for perceiving personal control (on the four component aspects) both types of open offices are equivalently lacking. Panels do not produce any more feelings of controlling the workspace than does total lack of barriers.

To find the general office variables which best predicted perceived control, correlations among the variables were obtained and those significantly correlated were entered into multiple regression. The comparison of results from the two studies show

EXPERIMENT 1	EXPERIMENT 2
feeling the space is yours*	feeling the space is yours*
job classification*	type office
satisfaction with space*	work related privacy
number sharing office**	personal privacy
age	age
type office**	
sex	
status (at time 3)	

* final predictors in regression formula

** not applicable to Study 2

Questions on privacy were not included in Experiment 1. However, Experiment 2 indicates that privacy in the office is control-related and needs to be explicated further.

Just how do people exert personal control in an office setting? That depends somewhat upon the situation they are trying to control and especially upon the props they have to work with. People in both experiments reported using fewer behaviors to try to control coming into the workspace, but used more when trying to control interruptions. It will be remembered that controlling interruptions was most highly correlated with the control factor. Possibly this is a more crucial element or an element about which people feel they have more of a right to assert control, since it is more directly job-related than the others.

The data from Experiment 1 shows that when people have environmental props such as doors, they tend to use them and successfully so.

The methods used at survey time 3 in Experiment 1 and at Experiment 2 to elicit behaviors, probably resulted in more valid results for several reasons. By listing behaviors, people did not have to search their memories and forget certain ones. They were reminded of the most common behaviors. Also, people probably put less effort into an open ended question once they put down one answer. With the list, people were encouraged to report all their behaviors with less effort.

At both times (survey time 3 in Experiment 1 and in Experiment 2) keeping busy and ignoring people were the most popular ways of keeping people out of the workspace. Again, at both times there was agreement on ways of controlling unwanted interruptions. The three most used behaviors were as follows: asking people not to (develop understanding), leaving desk to work elsewhere, and keeping busy and being businesslike. There appears to be a commonality of solutions across settings for solving control problems in the office. Thus in both open office designs, social-type solutions predominated over environmental solutions. In the conventional office setting, social and environmental solutions were used almost equally.

Although the social-environment distinction seemed useful in differentiating behaviors by office type, the active-passive dichotomy was of no help. These dichotomies were of no help, either, in attempting to discriminate subjects by "coping styles." It had been planned that subjects would be classified and then followed longitudinally for changes in behavior accompanying changes in office style. Not only was the overall number too small, but the numbers of behaviors reported by each person were too small to do a valid typing. Even for those subjects reporting enough information, there was usually no clear style of behavior.

In Experiment 1, office type did not mediate the apparent influence of the job tasks or requirements concerning social facilitation. The presence of others bothered those classified as professionals with complex job tasks in both open and conventional offices more so than non-professionals.

Experiment 2 data showed the opposite results. However, the working circumstances may better explain these results than job tasks or requirements. Since most of the staff was out of the office a good deal, they viewed the time in the office interacting with fellow employees as positive.

Office design had a significant effect on the status recognition or support felt by employees. Those in the open office with panels

(Experiment 1) felt more dissatisfied on this aspect than those in the conventional layout. However, in Experiment 2, with the open, pool design, this was not the case, with everyone being fairly satisfied. This appears to be an area where the norms of the group or "corporate philosophy" can be conveyed through the office layout. There was little status differentiation on a physical level at the Hewlett-Packard (Experiment 2) office and none was expected. The layout seems to have been purposefully designed with that message. In the Water Management District building (Experiment 1), the office design distinctions were more obvious and the status message carried by environmental design was more salient.

Results from Experiment 1 support the status recognition findings by Konar et. al., while Experiment 2 adds the privacy dimension. It appears that even in an office setting where people are satisfied with their spaces and status recognition and where status demarcation is not an issue, privacy is still seen as a status marker because they were significantly correlated.

For the most part, it appears that the office design did not relate to satisfaction with the level of socializing or with the reported levels of morale. In Experiment 1, results on morale were not as predicted (morale got lower), but this was attributed to administration and employees and not to the building. In fact, the level of morale attributed to the building in all office types at both Time 3 of Experiment 1 and Experiment 2 was the same--21%.

The higher level of morale attributed to the building in Experiment 1 at survey times 1 and 2 (just prior to and one month after the move to the new building) support Proshansky and Kaminoff's (1980) view that the physical setting serves as a backdrop for social interactions, with people being unaware of its influence until the setting changes, becomes unique, or is dysfunctional.

Office design had mixed effects on satisfaction with the workspace. In Experiment 1 it was significantly related to satisfaction: those in open offices were dissatisfied; those in conventional offices were satisfied. However, in Experiment 2, those in the open, pool office were also satisfied. This seems to be a case where the effects of office design were mediated by expectations of the group. For the Experiment 2 sample, everyone had the same workspace, by mandate of the corporation. Also, many of the employees spent a good deal of time out of their workspaces, possibly reducing the environmental impact of the workspace.

To summarize, the results of both experiments suggest the effects of office design are as follows:

STRONGLY AFFECTS	MIXED RESULTS*	DOES NOT AFFECT
Perceived Control	Satisfaction with Workspace	Satisfaction with Socializing
Behaviors Used to Assert Control	Morale	Social Facilitation Aspects
	Status Recognition	Satisfaction with Job
	Privacy	

* Not tested in all designs or mediated by norms of office, group expectations, etc.

Originally, an aim of this research was to follow the dynamics of the process of changing office design and adjustments made therewith. This was not able to be accomplished in the manner anticipated because of low response rates. The data for all respondents within a survey were aggregated and individual differences and sophisticated designs not used.

The hypotheses of a longitudinal nature generally predicted a time by office design interaction, with those in open offices expected to show more changes and adjustments during the period of adaptation to a new office layout. For the most part, these hypotheses or portions of hypotheses were not confirmed. Perhaps the questions were not sensitive enough to pick up the subtleties of adjustment to change.

There were two aspects of the study that the time dimension and the concept of changing and adjusting did add to the interpretation. These were in the behaviors used to exert personal control and in attribution of morale. There was some evidence that people changed behaviors as they adjusted to the new environment. However, this conclusion is clouded by the use of a better method of eliciting responses on the final survey in Experiment 1. The morale issue definitely showed a lessening of saliency of the building environment as the adaptation process proceeded.

The following variables were found to correlate with satisfaction with workspace and job:

EXPERIMENT 1

SATISFACTION WITH WORKSPACE:
feeling the space is really yours*
perceived control
morale
type of office**
satisfaction with job
number sharing space**
workunit

SATISFACTION WITH JOB:
morale
satisfaction with space

EXPERIMENT 2

SATISFACTION WITH WORKSPACE:
feeling the space is really yours
status
work related privacy
personal privacy
morale
sex

SATISFACTION WITH JOB:
morale

* final predictors in regression formula

** not applicable to Study 2

Since the number of subjects in Experiment 2 was small, the results will be viewed as suggestive, especially in this section.

It is interesting that there was one variable which was related to both workspace and job satisfaction in each experiment: morale. This seems especially important to job satisfaction. Feeling the space is really yours seems crucial to workspace satisfaction. Also interrelated, especially in Experiment 1, are workspace and job satisfaction.

Subjects in both experiments were satisfied with their jobs and attributed this satisfaction to themselves. Those who were dissatisfied attributed it to other sources.

Discussion

The best way to conceptualize this research is as a case study. Random assignment was impossible. Because of this and the small numbers, especially in Experiment Two, the statistics served more of a descriptive and suggestive function than a predictive one. Trying to generalize from much of this data will carry risks related to the validity issues delineated by Campbell and Stanley (1963) and Cook and Campbell (1979). However, a case study must also explicate all possible threats to validity so that the effects of the treatment are clear in this instance. The following should be considered:

1. History

Variables were chosen in an effort to eliminate history effects and to be as directly under the influence of the treatment variables as possible. Personal control should not be directly effected by history issues.

2. Maturation

This is one of the hypothesized results of a change in environment—people become more experienced with and effective in the environment over time.

3. Testing

Familiarity with the test is a possible confounding. This would show up as correlated error, but since so few subjects took both Time 2 and Time 3 tests (the tests on which most of the inferential statistics are used) this is not a major problem in those analyses. This is a problem with the test-retest reliability method.

4. Instrumentation

The measuring instrument was not significantly changed over time. The one change that may be questionable was the change from black and white prints to color slides in the personalization photographs. However, correlations between the personalizations at both times indicate the change in instrumentation had no effect on the relative rates.

5. Statistical Regression

Since the employees had the choice to respond to the questionnaire, it may have been that only those feeling very strongly towards their workspaces responded, or only those feeling strongly about their jobs. The variances of most questions indicated a wide range of responses. However, in both studies respondents were overwhelmingly satisfied with their jobs. Results must be qualified with the statement that they are for relatively satisfied employees. Those who are dissatisfied may have different patterns of responses since they may attribute their problems more to external and environmental causes.

6. Selection

This is a possible threat because the treatment was not randomly assigned. The majority of people in the open space in Experiments 1 and 2 were of scientific background, while those in conventional offices were administrative people. They may have different styles of dealing with people and problems regardless of the constraints of the environment.

This is one of the aspects of a case study over which the researcher has very little control. For this reason it is necessary to review and compare other comparable studies to determine the similarities of reactions in isolating the operative variables and conditions. This will ultimately lead to the ability to generalize over populations, settings, and times.

7. Mortality

Because many of the subjects did not complete more than one in the series of questionnaires, many of the analyses originally planned were not completed. Of those done, mortality is not an issue.

The above caveats withstanding, personal control was clearly an issue in the settings tested in this research. People did not wish to have a correspondence between what they wanted or needed and their ability to achieve it. The need to feel potent is as necessary in the office-place as anywhere else. This potency clearly extends to what is desired from the environmental context and the ability to fulfill it. The role of control in the office is more fundamental than Wineman's (1982) suggestion that it serves to reduce the negative impacts of environmental factors, thereby increasing satisfaction. More likely, satisfaction is just one of many consequences (along with privacy, crowding, stress, and place-identity) of achieving or not achieving a sense of personal control.

The intent of this research was to understand personal control in a fairly restrictive setting--the office place. Here, people perceived control as being related to ability to control coming into or passing through space, ability to arrange or rearrange the space, ability to control bothersome noise, and the ability to control unwanted interruption. Ability to control interruptions was especially important, since it is probably the most work-related aspect of the four.

One unique aspect of this research was actually to present subjects with a problem and ask what behaviors they used to solve it. Subjects were asked to list ways they controlled others coming into their spaces and unwanted interruption. Although these questions did not elicit the numbers of responses expected, the variety and range did allow for the hypothesized dichotomies of social-environmental and active-passive, although the former was the more useful. As expected, people did experience a change in behavior patterns over time as they adapted to a new environment. At Time 2, one month after the move, people in open offices were using different styles of behaviors to determine which ones would be effective. This would correspond to Lewin's unfreezing and changing stages. By Time 3, six months after the move, those in the open offices had developed a pattern of predominantly social-interaction control behaviors. This supports the expectation that during the refreezing stage, as new norms of social behaviors are being accepted, coping styles would become permanent and interaction behaviors would become more routinized.

This explanation is given further credence by the finding that control behaviors used in the open office in Experiment Two were predominantly the same as those used at Time 3 in Experiment One.

Apparently open offices foster some universally successful coping and controlling behaviors which are arrived at independently.

Although these findings did not support the pattern of behavior hypothesized in the study, the results actually are better explained by Lewin's theory than would the hypothesized pattern have been. The time-frame of the hypotheses was incorrect.

These findings need to be verified using behavioral observation techniques to validate self-reports and to explore additional behavior patterns not readily reportable.

The factors of social facilitation, status recognition, morale, and socializing need more experimentation. Results of this study and comparisons of these results with other ones do not allow clear conclusions to be drawn about the effect of office design on them. It would seem that these factors may be more situationally specific and need to be considered by design decision-makers as ramifications of particular office layouts. Office norms and groups expectations may be more significant than design for these variables.

Disappointingly, the personalization of space by employees was not related to the parameters tested in this study in any conclusive way. The only explanation is that personalizing space is largely a function of personality.

Corporations and organizations are moving towards consideration of employees' needs and satisfactions as a direct or indirect performance influence. The direct link has yet to be made empirically, but research is starting to consider the contributions of environmental and job satisfaction. The results of this study are in agreement with the Sundstrom studies (1980, 1982) and Konar (1982) which found that satisfaction with the workspace is related to environmental/social psychological aspects of the work setting. This in turn is somewhat related to job satisfaction, but the two seem to have different origins.

The Marans and Spreckelmeyer (1982) model for office evaluations (Figure 1) is one of the few at this time to formally articulate these relationships.

Of the general office aspects tested in this research, the following variables were significantly correlated with the satisfaction criterion (in either experiment) within the context of their model:

OBJECTIVE ENVIRONMENTAL CHARACTERISTICS

- Type of office
- Number sharing office
- Workunit

PERSON CHARACTERISTICS

- Sex

ORGANIZATIONAL CONTEXT

- Level of morale

PERCEPTIONS/ASSESSMENTS OF OBJECTIVE ENVIRONMENTAL CHARACTERISTICS

- Feeling the space is really yours
- Perceived personal control
- Work privacy
- Personal privacy
- Status

Contrary to predictions in their model, satisfaction with the job was also related to workspace satisfaction (for Experiment 1, only).

For job satisfaction the correlated variables were

ORGANIZATIONAL CONTEXT

Level of morale

Again relation between job and workspace satisfaction was significant.

The lack of correlation between job satisfaction and the variables measured in this research indicates that for satisfied employees, at least, the social-psychological/environmental realm is of little importance. This research focused more on the bottom half of the Marans and Spreckelmeyer model (environmental satisfaction). It may be said that the overlap of variables contributing to the two types of satisfaction is very small, only morale seeming to bridge the gap. Further extensive research testing the entire model may find other common denominators.

The implications for collaboration between designers and psychologists are favorable. From a theoretical level, it seems conclusive that the concept of personal control plays as important role in employees' adjustment to and behavior in the workspace. Office design has been shown to strongly affect the perception and assertion of personal control. If an architect or space planner should wish to systematically incorporate personal control into the design, this study could be useful in explicating some of the parameters.

Ability to control interruptions was found to be quite important to employees. This is more difficult in open office settings. A common solution used in this study was for employees to seek out other places to work, although none had been intentionally provided. Architects could set aside designated areas and rooms for concentrated work effort, especially if the main workspace area is to be of an open configuration.

Another interesting finding was that on the parameters tested in this study (interruptions, coming into space, noise, and arranging area) panels seemed to have little consequence for perceiving personal control or satisfaction with the workspace. This finding needs to be explored further, especially with privacy considerations added. However, it might suggest that money spent on panels should be better used on other amenities such as the separate rooms mentioned above.

Job task and job category are interwoven with environmental considerations. Those people doing complex occupation tasks or tasks of an interpersonal and confidential nature seem to need more insulation from others. Environmental support is necessary to achieve the desired level of insulation. This support is often in the form of private offices (walls and doors). At the Water Management District (Experiment One) a problem seemed to arise from the environmental insulation accorded by job category, rather than job task. Those in the administration and management were placed in private offices, while some professionals doing complex tasks were placed in the open offices. The open workspaces did not afford them the insulation necessary for their tasks. In Experiment Two this problem was ameliorated by the work routine; most of the employees who performed non-routine tasks were out of the office frequently.

The implication for designers is that the organizational chart may not be the best indicator of the amount and type of environmental insulation or support needed. The actual tasks performed by the employees and the work routine of the organization may heighten or lessen the importance of architectural intervention.

Closely associated with the issue of architectural insulation is that of status, since greater insulation is typically associated with higher status. This seems to be an area in which designers, psychologists, and organizational decision-makers particularly need to interact. The organizational climate needs to be carefully assessed to determine the role status plays. Organizational policy and architectural recognition of this policy need to coincide and support each other. Yet attention must also be given to more informal status symbols that often evolve in a group. There will not be any one design solution to this situation. What is necessary is that each solution should fit the needs of the particular organization after careful assessment and that recognition be given to the psychological implications of the chosen solution.

APPENDICES

APPENDIX A
TIME 1 SURVEY

This is a survey designed to study your attitude toward your work/ office space, the problems you may be having in relation to this space, and how these may effect other work-related issues. The intention is to assess how these issues change over time. Thus, this is the first phase of a project to determine the changes of environmental attitudes over time.

Your cooperation is entirely voluntary. We ask that you participate in the hope of helping to bring to light some of the good and bad aspects of your work environment. However, the more people who answer, the more complete statement we can make.

All answers will be kept strictly confidential; no names will ever be associated with any particular answers. To ensure this we ask that you put your name on the enclosed file card. The number on the card should be the same as that on your form next to "STUDY NUMBER". Then place the file card in the stamped envelope enclosed with this packet. This will ensure that no one but the researchers will be able to determine the person who completed the questionnaire. When you have completed the forms, please mail them and the card with your name on it in the addressed, stamped envelope.

A copy of the final results will be made available to anyone who wishes it. A copy, along with any recommendations arising from this study, will be given to the administration.

Please remember that it is your own opinions we want to know, so please don't fill them out in conjunction with anyone else.

Thank you for your cooperation.

Marvin E. Shaw, Ph.D.

STUDY NUMBER ___________

1. Your age _____________.

2. Your sex: Female ___________, Male ___________.

3. Your job title:____________________________________.

4. How long have you worked for this employer?_______________.

5. How long have you been in your present work/office space?__________.

These next questions concern your "main work/office space," that is the area where you spend more than half of your working time.

6. Do you share your main work/office space with anyone else?
YES ____, NO ____

If "YES", please answer a and b:
a. How many other people share your main work space? ______________

b. How much do you feel having others in this space interferes with your work?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

7. To what extent are you able to keep people from coming into or passing through your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

8. There are many ways people can control whether or not people come into their space. Some may tell others not to enter, or place furniture or other barriers in the way. Please list the ways you control whether or not people come into your main work space.

9. To what extent are you able to prevent, if you wish to, unwanted interruptions while working in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

10. People can signal whether or not they are receptive to others talking to them by doing things like closing the door, facing their desks away from others, not answering the phone, etc. Please list the ways that you control whether or not your are interrupted in your main work space.

11. So you have control over stopping or turning down bothersome noise in your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

12. Do you feel you can arrange or rearrange things in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

13. What do you like most about your main work space?

14. What do you like least about your main work space?

15. To what extent do you feel that your main work space is really "yours"?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

16. Depending on circumstance, different people have different areas that they feel are really their own spaces. Examples may be just their desks, or maybe 3 feet all around the desk, or half a room, or maybe the whole room. Please describe briefly what your area is in your main work space.

17. In general, how satisfied are you with your main work space?

__________;	__________;	__________;	__________;	__________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

The following questions are on the boarder work environment.

18. In general, how do you feel morale, or spirit, is among those working here?

__________;	__________;	__________;	__________;	__________
HIGH	SOMEWHAT HIGH	NEITHER	SOMEWHAT LOW	LOW

19. To what extent (in percentage) do you feel this level of morale is because of each of the following:

THE EMPLOYEES _____%, THE ADMINISTRATION _____%, THIS BUILDING _____%

20. Would you like the amount of socializing here at work to be:

MORE ___________, THE SAME ___________, LESS ___________.

21. Overall, how satisfied are you with your present job?

___________;___________;___________;___________;___________

SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

22. To what extent (percent) is this level because of each of the following:

YOURSELF ___________%, THE OTHER EMPLOYEES ___________%,

THE ADMINISTRATION ___________%, THIS BUILDING ___________%

APPENDIX B
TIME 2 SURVEY

This is a survey designed to study your attitude toward your work/office space, the problems you may be having in relation to this space, and how these may effect other work-related issues. The intention is to assess how these issues change over time.

You may have completed a similar form prior to this. If so, please do not try to remember your answers. This questionnaire is concerning your present situation. If you have not completed a prior questionnaire, please answer as you feel presently and do not collaborate with anyone else as we are interested in your own thoughts.

Your cooperation is entirely voluntary. We ask that you participate in the hope of helping to bring to light some of the good and bad aspects of your work environment. However, the more people who answer, the more complete statement we can make.

All answers will be kept strictly confidential; no names will ever be associated with any particular answers. Please complete the questionnaire and place it in the accompanying envelope. Place this sealed envelope in the manila envelope at the front desk. This will be collected next Wednesday.

Thank you for your cooperation.

STUDY NUMBER ___________

1. Your age _____________.

2. Your sex: Female ___________, Male ___________.

3. Your job title:____________________________________.

4. How long have you worked for this employer?_______________.

5. How long have you been in your present work/office space?__________.

These next questions concern your "main work/office space," that is the area where you spend more than half of your working time.

6. Do you share your main work/office space with anyone else?
YES ____, NO ____

If "YES", please answer a and b:
a. How many other people share your main work space? ______________

b. How much do you feel having others in this space interferes with your work?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

7. To what extent are you able to keep people from coming into or passing through your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

8. There are many ways people can control whether or not people come into their space. Some may tell others not to enter, or place furniture or other barriers in the way. Please list the ways you control whether or not people come into your main work space.

9. To what extent are you able to prevent, if you wish to, unwanted interruptions while working in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

10. People can signal whether or not they are receptive to others talking to them by doing things like closing the door, facing their desks away from others, not answering the phone, etc. Please list the ways that you control whether or not your are interrupted in your main work space.

11. So you have control over stopping or turning down bothersome noise in your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

12. Do you feel you can arrange or rearrange things in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

13. What do you like most about your main work space?

14. What do you like least about your main work space?

15. To what extent do you feel that your main work space is really "yours"?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

16. Depending on circumstance, different people have different areas that they feel are really their own spaces. Examples may be just their desks, or maybe 3 feet all around the desk, or half a room, or maybe the whole room. Please describe briefly what your area is in your main work space.

17. In general, how satisfied are you with your main work space?

__________;	__________;	__________;	__________;	__________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

The following questions are on the boarder work environment.

18. In general, how do you feel morale, or spirit, is among those working here?

__________;	__________;	__________;	__________;	__________
HIGH	SOMEWHAT HIGH	NEITHER	SOMEWHAT LOW	LOW

19. To what extent (in percentage) do you feel this level of morale is because of each of the following:

THE EMPLOYEES _____%, THE ADMINISTRATION _____%, THIS BUILDING _____%

20. Would you like the amount of socializing here at work to be:

MORE ____________, THE SAME ____________, LESS ____________.

21. Overall, how satisfied are you with your present job?

____________;	____________;	____________;	____________;	____________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

22. To what extent (percent) is this level because of each of the following:

YOURSELF ____________%, THE OTHER EMPLOYEES ____________%,

THE ADMINISTRATION ____________%, THIS BUILDING ____________%

23. Is your present office space in a

LARGE OPEN OFFICE ____________; SMALL MORE PRIVATE OFFICE __________;

OTHER (PLEASE SPECIFY) ____________________.

24. Briefly, what types of adjustment problems have you noticed for yourself and others in getting used to the new office environment?

APPENDIX C
TIME 3 SURVEY

This is the final survey of a series designed to study your attitudes toward your word/office space, the problems you may be having in relation to this space and how these may affect other work-related issues.

Since you have been in your office for about six months and are fully accustomed to it, you are aware of some of the advantages and disadvantages of the building design. You are probably also aware of some changes which you and your fellow workers have had to make in adapting to a different office environment. Some have been physical, others have probably involved a change in the way people interact. The purpose is two-fold: to see what type of adaptations have been necessary and also to determine which problems these have solved and which problems still exist that need attention.

Your cooperation is entirely voluntary. We ask that you participate in the hope of helping to bring to light some of the good and bad aspects of your work environment. A final copy of the results will be available to anyone who wishes it. A copy, along with any recommendation arising from this study, will be given to the administration.

All answers will be strictly confidential; no names will ever be associated with any particular answers. Please complete the questionnaire and place it in the accompanying envelope. Place this sealed envelope in the manila envelope at the front desk. This will be collected next Wednesday.

Thank you for your cooperation.

Marvin E. Shaw, Ph.D.

Annette Pearce Worsham

STUDY NUMBER ____________

1. Your age ______________.

2. Your sex: Female ____________, Male ____________.

3. Your job title:_______________________________________.

4. How long have you worked for this employer?________________.

5. How long have you been in your present work/office space?___________.

THESE NEXT QUESTIONS CONCERN YOUR MAIN WORK/OFFICE SPACE.

6. Is your present office in an

OPEN AREA ____________; INDIVIDUAL OFFICE ____________; OTHER ____________
(Specify)

6a. How do you feel the presence of others affects your work performance?

AFFECTS POSITIVELY ______; NO EFFECT ______; AFFECTS NEGATIVELY ______

DOES NOT APPLY ______.

7. To what extent do you feel your office/work space affords you the professional recognition you should have?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

8. To what extent are you able to keep people from coming into or passing though your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

9. There are many ways people can control whether or not people come into their space. Some of these are listed below. Please check the ones you use or have used and the extent to which they worked. Please add any that are not already listed.

	HAVE TRIED	WORKS WELL	WORKS SOMETIMES	DOES NOT WORK
a. close door				
b. have secretary monitor				
c. change desk orientation				
d. place a physical barrier				
e. ask people not to				

f. ignore people
g. stay busy and be business-like
h. ________________________
i. ________________________

10. To what extent are you able to prevent, if you wish to, unwanted interruptions while working in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

11. Please check the way you have used to control unwanted interruptions.

	HAVE TRIED	WORKS WELL	WORKS SOMETIMES	DOES NOT WORK
a. close door				
b. have secretary monitor				
c. change desk orientation				
d. leave desk and work elsewhere				
e. develop understanding with others by asking them to come back later or telling them you are busy				
f. discourage conversation and be business-like				
g. ignore people				
h. keep busy and concentrate on work				
i. not answer phone				
j. ________________________				
k. ________________________				

12. Do you have control over stopping or turning down bothersome noise in your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

13. Do you feel you can arrange or rearrange things in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

14. What do you like most about your main work space?

15. What do you like least about your main work space?

16. To what extent do you feel that your main work space is really "yours"?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

17. Depending on circumstance, different people have different areas that they feel are really their own spaces. Examples may be just their desks, or maybe 3 feet all around the desk, or half a room, or maybe the whole room. Please describe briefly what your area is in your main work space.

18. In general, how satisfied are you with your main work space?

____________;	______________;	____________;	_________________;	______________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

THE FOLLOWING QUESTIONS ARE ON THE BOARDER WORK ATMOSPHERE.

19. In general, how do you feel morale, or spirit, is among those working here?

____________;	______________;	____________;	_________________;	______________
HIGH	SOMEWHAT HIGH	NEITHER	SOMEWHAT LOW	LOW

20. To what extent (in percentage) do you feel this level of morale is because of each of the following:

THE EMPLOYEES _____%, THE ADMINISTRATION _____%, THIS BUILDING _____%

21. Would you like the amount of socializing here at work to be:

MORE ____________, THE SAME ____________, LESS ____________.

22. Overall, how satisfied are you with your present job?

____________;	______________;	____________;	_________________;	______________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

23. To what extent (percent) is this level because of each of the following:

YOURSELF ____________%, THE OTHER EMPLOYEES ____________%,

THE ADMINISTRATION ____________%, THIS BUILDING ____________%

24. Briefly, what types of adjustment problems have you noticed for yourself and others in getting used to the new office environment?

APPENDIX D
HEWLETT-PACKARD SURVEY

This is a survey designed to study your attitude toward your work/ office space, the advantages and disadvantages of this space, and how these may effect other work-related issues. The intention is to compare various types of office layout to see how the people who work in these offices feel about them.

Your cooperation is entirely voluntary. We ask that you participate in the hope of helping to bring to light some of the good and bad aspects of your work environment ultimately to help office designers create good office buildings. The more people who answer, the more complete statement I can make.

All answers will be kept strictly confidential; no names will ever be associated with any particular answers. The results of this study will be reported in professional journals and to design and behavior professionals in a statistical manner. To ensure confidentiality, please put your name on the enclosed file card. The number on the card should be the same as that on your form next to "STUDY NUMBER". Please give this card to the researcher or place it in the envelope enclosed with this packet. Please return the completed form to the researcher today.

In research of this kind, it is necessary to ensure that the survey form is reliable (that people will always respond to it in the same way, regardless of when it is given). Reliability is determined by asking people to complete the form more than once. If you would be willing to complete this form again in a few weeks, for this purpose, please check this statement which is also on your file card.

Please remember that it is your own opinions that are needed, so please don't fill them out with anyone else.

Thank you for your cooperation.

Annette Pearce Worsham

STUDY NUMBER __________

1. Your age ____________.

2. Your sex: Female __________, Male __________.

3. Your job title:______________________________.

4. How long have you worked for this employer?____________.

5. How long have you been in your present work/office space?_________.

THESE NEXT QUESTIONS CONCERN YOUR MAIN WORK/OFFICE SPACE.

6. Is your present office in an

OPEN AREA __________; INDIVIDUAL OFFICE __________; OTHER __________ (Specify)

6a. How do you feel the presence of others affects your work performance?

AFFECTS POSITIVELY _____; NO EFFECT _____; AFFECTS NEGATIVELY _____

DOES NOT APPLY _____.

7. To what extent do you feel your office/work space affords you the professional recognition you should have?

VERY MUCH _____, PRETTY MUCH _____, SOMEWHAT _____, NOT AT ALL _____.

8. To what extent are you able to keep people from coming into or passing though your main work space if you wish to do so?

VERY MUCH _____, PRETTY MUCH _____, SOMEWHAT _____, NOT AT ALL _____.

THIS DOES NOT OCCUR _____.

9. There are many ways people can control whether or not people come into their space. Some of these are listed below. Please check the ones you use or have used and the extent to which they worked. Please add any that are not already listed.

	HAVE TRIED	WORKS WELL	WORKS SOMETIMES	DOES NOT WORK
a. close door				
b. have secretary monitor				
c. change desk orientation				
d. place a physical barrier				
e. ask people not to				

f. ignore people
g. stay busy and be business-like
h. ______________________
i. ______________________

10. To what extent are you able to prevent, if you wish to, unwanted interruptions while working in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

11. Please check the way you have used to control unwanted interruptions.

	HAVE TRIED	WORKS WELL	WORKS SOMETIMES	DOES NOT WORK
a. close door				
b. have secretary monitor				
c. change desk orientation				
d. leave desk and work elsewhere				
e. develop understanding with others by asking them to come back later or telling them you are busy				
f. discourage conversation and be business-like				
g. ignore people				
h. keep busy and concentrate on work				
i. not answer phone				
j. ______________________				
k. ______________________				

12. Do you have control over stopping or turning down bothersome noise in your main work space if you wish to do so?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

THIS DOES NOT OCCUR ______.

13. Do you feel you can arrange or rearrange things in your main work space?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

14. What do you like most about your main work space?

15. What do you like least about your main work space?

16. To what extent do you feel that your main work space is really "yours"?

VERY MUCH ______, PRETTY MUCH ______, SOMEWHAT ______, NOT AT ALL ______.

17. Depending on circumstance, different people have different areas that they feel are really their own spaces. Examples may be just their desks, or maybe 3 feet all around the desk, or half a room, or maybe the whole room. Please describe briefly what your area is in your main work space.

18. In general, how satisfied are you with your main work space?

____________;	____________;	____________;	____________;	____________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

THE FOLLOWING QUESTIONS ARE ON THE BOARDER WORK ATMOSPHERE.

19. In general, how do you feel morale, or spirit, is among those working here?

____________;	____________;	____________;	____________;	____________
HIGH	SOMEWHAT HIGH	NEITHER	SOMEWHAT LOW	LOW

20. To what extent (in percentage) do you feel this level of morale is because of each of the following:

THE EMPLOYEES _____%, THE ADMINISTRATION _____%, THIS BUILDING _____%

21. Would you like the amount of socializing here at work to be:

MORE ____________, THE SAME ____________, LESS ____________.

22. Overall, how satisfied are you with your present job?

____________;	____________;	____________;	____________;	____________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

23. To what extent (percent) is this level because of each of the following:

YOURSELF ____________%, THE OTHER EMPLOYEES ____________%,

THE ADMINISTRATION ____________%, THIS BUILDING ____________%

24. Briefly, what types of adjustment problems have you noticed for yourself and others in getting used to the new office environment?

25. Overall, how satisfied are you with your present job?

___________;	____________;	___________;	_______________;	______________
SATISFIED	SOMEWHAT SATISFIED	NEITHER	SOMEWHAT DISSATISFIED	DISSATISFIED

26. To what extent (percent) is this level because of each of the following?

YOURSELF ___________%, THE OTHER EMPLOYEES ___________%,

THE ADMINISTRATION ___________%, THIS BUILDING ___________%

Hello,

Thank you very much for completing the survey last month on your attitude toward your office space. Your information will make a large contribution towards the understanding of the dynamics of the office-place.

Equally as important as collecting the original data, and in some ways even more important, is showing that the data are reliable. Without proof of reliability, the original data cannot be used for statistical generalizations. Fortunately, you were kind enough to agree to complete the survey a second time to help me obtain a reliability rating. I appreciate your taking these few extra minutes to do so.

Please do not try to remember how you answered your previous questionnaire. It is important that you answer for how you feel now. When you have completed the form, place it in the stamped envelope and mail it to me.

Thank you for your cooperation.

Sincerely,

Annette Pearce Worsham

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BIOGRAPHICAL SKETCH

Annette Pearce Worsham was born April 20, 1948, in Wilkes-Barre, Pennsylvania. She attended Dickinson College in Carlisle, Pennsylvania, graduating in 1970 with an English major. Her employment history includes working for the Social Security Administration in Washington, D.C., and serving as a social worker in the Adult Mental Health Unit for the Florida Department of Health and Rehabilitative Services in Gainesville, Florida. She enrolled in the social psychology program at the University of Florida in September, 1975, and received the Master of Arts degree in 1978. She is married and the mother of two children.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Marvin E. Shaw

Marvin E. Shaw, Chairman
Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Ted Landsman

Ted Landsman
Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

L J Severy

Lawrence J. Severy
Associate Professor of Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Earl Starnes
Professor of Urban and Regional Planning

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Leland Shaw
Professor of Architecture

This dissertation was submitted to the Graduate Faculty of the Department of Psychology in the College of Liberal Arts and Sciences and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August, 1983

Dean for Graduate Studies and Research